

# Five Lakes Aquatic Vegetation Management Plan Update 2006 Lagrange County, Indiana

28 February 2007



Prepared for:  
**Five Lakes Conservation Association, Inc.**  
Wolcottville, IN 46795

Prepared by:  
  
c/o Sara Peel  
708 Roosevelt Road  
Walkerton, IN 4657

## **FIVE LAKES AQUATIC PLANT MANAGEMENT PLAN UPDATE LAGRANGE COUNTY, INDIANA**

### **EXECUTIVE SUMMARY**

This document is intended to update the 2004 Aquatic Plant Management Plan for the Five Lakes (Witmer, Westler, Dallas, Hackenburg, and Messick lakes) in Lagrange County, Indiana. The following update specifically addresses the results of the aquatic plant surveys conducted during the 2006 season and compares the results with variations in the plant communities in the lakes over a period of the past three growing seasons. The Aquatic Plant Management Plan of 2004 should be consulted for complete information regarding aquatic plant management at Five Lakes

Two Tier I surveys were conducted in June and August to determine the nature of the plant community and effectiveness of treatment. Survey results indicate that aquatic plant growth tends to decline as water quality and clarity declines. Aquatic plants within the Five Lakes are limited by the substrate available for colonization and by the amount of light available for them to photosynthesize. Plant densities declined from those observed during the June surveys to the relatively sparse communities that were present during the August surveys. Eurasian watermilfoil was noted as growing in high abundance in approximately 30 acres of the Five Lakes during the June surveys. However, most of this growth declined to manageable levels at the time of the August surveys. Additionally, Eurasian watermilfoil abundance is lower than abundances observed by Weed Patrol in 2004 and by the DNR in 2005.

Comparing the 2004, 2005, and 2006 Tier II survey metrics indicates that the quality of the native aquatic plant community in all of the lakes is increasing. More submergent plant species were observed within the Five Lakes during the current assessment than in previous years. Relative and mean densities for most species are relatively low with the exception of coontail in Hackenburg and Messick lakes. All five lakes possessed metric values that were greater than the average values for plant community metrics found by Pearson (2004) for 21 northern Indiana lakes. However, because Pearson study was not intended nor designed to create baseline native aquatic plant data for evaluative purposes, over-reliance on comparisons to Pearson's data in making management decisions should be avoided.

Additional items including a public meeting and a meeting between the contractor, LARE program staff, the district fisheries biologist, and a representative from the FLCA, also occurred in concert with this aquatic plant management plan update. The details of these are not repeated here, but were utilized to generate recommendations as follows:

1. Treatment of approximately 10 acres of Eurasian watermilfoil in high usage or heavy traffic areas.
2. Reassessment of the lakes following water quality project implementation within the watershed. Improving the water quality entering the lakes will likely result in increased clarity and light penetration which will ultimately result in more aquatic plant growth.

Estimated costs for 2007 assessment and treatment are as follows:

- Eurasian watermilfoil treatment: maximum total cost of \$5,000.
- Assessment costs based on 2006 requirements are estimated to total \$12,450, while the plan update is anticipated to occur as a cost of \$5000.
- Total fees for 2007 aquatic plant assessment, herbicide application, and plan updated are estimated at \$22,450.

## **ACKNOWLEDGEMENTS**

The Indiana Department of Natural Resources Division of Fish & Wildlife as part of the Lake and River Enhancement Program (LARE) provided funding for the development of this plan. The plan has been developed in cooperation with the Five Lakes Conservation Association. Thanks to Bob Christen, John Buck, and Jim Craig for their time, enthusiasm, and driving abilities. Fieldwork, data analysis and map generation was performed by JFNew with the assistance of Five Lakes Conservation Association volunteers. The authors of this update include Sara Peel, Betsy Ewoldt, Scott Namestnik, and Mark Pranckus.

## TABLE OF CONTENTS

1.0 Introduction .....	1
2.0 Watershed and Lake Characteristics .....	1
3.0 Lake Uses .....	2
4.0 Fisheries .....	2
5.0 Problem Statement .....	2
6.0 Aquatic Vegetation Management Goals and Objectives .....	2
7.0 Past Management Efforts .....	2
8.0 Aquatic Plant Community Characterization .....	3
8.1 Methods .....	3
8.2 Results .....	4
8.3 Discussion .....	49
9.0 Aquatic Vegetation Management Alternatives .....	49
10.0 Public Involvement .....	49
11.0 Public Education .....	50
12.0 Integrated Treatment Action Strategy .....	50
13.0 Project Budget .....	51
14.0 Monitoring and Plan Updates .....	51
15.0 References Cited .....	53



## LIST OF FIGURES

	PAGE
Figure 1. Plant beds identified in Witmer Lake during the spring and summer Tier I aquatic plant surveys, June 5 and August 10, 2006 .....	6
Figure 2. Plant beds identified in Westler Lake during the spring and summer surveys, June 5 and August 10, 2006 .....	9
Figure 3. Plant beds identified in Dallas Lake during the spring and summer Tier I surveys, June 5 and August 10, 2006 .....	12
Figure 4. Plant beds identified within Hackenburg and Messick Lakes during spring and summer Tier I surveys, June 5 and August 10, 2006.....	23
Figure 5. Dense curly-leaf pondweed and Eurasian watermilfoil locations identified within the Five Lakes during the 2006 assessments.....	28
Figure 6. Locations sampled during the Five Lakes Tier II survey as sampled which occurred on August 4 and 10, 2006.....	30
Figure 7. Eurasian watermilfoil locations in the Five Lakes as sampled during the Tier II surveys which occurred on August 4 and 10, 2006 .....	31
Figure 8. Curly-leaf pondweed locations identified as sampled during the Tier II surveys which occurred on August 4 and 10, 2006.....	32
Figure 9. Recommended 2007 treatment areas within the Five Lakes.....	52

## LIST OF TABLES

	<b>PAGE</b>
Table 1. Spring and summer transparency measurements and estimated littoral zones as determined June 5 and 7 and August 9 and 10, 2006 .....	3
Table 2. Tier II sampling strategy for Big and Little Chapman Lakes using the 2006 Tier II protocol .....	4
Table 3. Survey schedule of Tier I and II surveys .....	4
Table 4. Witmer Lake Tier I survey results for spring and summer surveys which occurred June 5 and August 10, 2006 .....	7
Table 5. Westler Lake Tier I survey results for spring and summer surveys which occurred June 5 and August 9, 2006 .....	10
Table 6. Dallas Lake Tier I Beds 1 through 6 survey results for spring and summer surveys which occurred June 7 and August 9, 2006 .....	13
Table 7. Dallas Lake Tier I Bed 7 through 12 survey results for spring and summer surveys which occurred June 7 and August 9, 2006 .....	14
Table 8. Tier I survey results for spring and summer surveys of the channel connecting Dallas and Hackenburg lakes which occurred June 5 and August 10, 2006 .....	19
Table 9. Hackenburg Lake Tier I survey results for spring and summer surveys which occurred June 5 and August 10, 2006 .....	31
Table 10. Tier I survey results for spring and summer surveys of the channel connecting Hackenburg and Messick lakes which occurred June 5 and August 10, 2006 .....	24
Table 11. Messick Lake Tier I survey results for spring and summer surveys which occurred June 7 and August 10, 2006 .....	26
Table 12. Witmer Lake, summer Tier II survey metrics and data, August 10, 2006 .....	34
Table 13. Westler Lake, summer Tier II survey metrics and data, August 4, 2006 .....	36
Table 14. Dallas Lake, summer Tier II survey metrics and data, August 4, 2006 .....	39
Table 15. Hackenburg Lake, summer Tier II survey metrics and data, August 10, 2006 .....	43
Table 16. Messick Lake, summer Tier II survey metrics and data, August 10, 2006 .....	45
Table 17. A comparison of the aquatic plant communities in the Five Lakes to the average values for plant community metrics found by Pearson (2004) in his survey of 21 northern Indiana lakes .....	48

## LIST OF APPENDICES

- Appendix A: June Tier I survey datasheets.
- Appendix B: August Tier I survey datasheets.
- Appendix C: August Tier II survey data
- Appendix D: Hydrilla identification information
- Appendix E: Permit applications for aquatic plant treatment at the Five Lakes

## **1.0 Introduction**

This report serves as an update to the 2005 Indiana Chain of Lakes Aquatic Plant Management Plan 2005-2008 completed by Weed Patrol, Inc. The update will serve as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for additional LARE funds. Items covered include a review of details of the 2006 vegetation control efforts (non-LARE funded); spring and summer Tier I and summer tier II results from the 2006 season; a comparison of Tier II results from 2004, 2005 (IDNR), and 2006 from all available data sources; a recap from the public meeting, and a discussion of potential management implications of the results. The plan update was funded by the Indiana Department of Natural Resources (DNR) Lake and River Enhancement Program (LARE) and the Five Lakes Conservation Association (FLCA). This is the second year that the Five Lakes have been involved in aquatic plant management planning through the LARE program.

During the 2006 growing season the following actions were taken.

- June 5 and 7, 2006: Tier I aquatic plant survey completed on all five lakes.
- August 4, 9, and 10, 2006: Tier I and Tier II aquatic plant surveys completed on all five lakes.
- September 23, 2006: Public meeting to discuss aquatic plant survey results and potential treatment.
- October 25, 2006: Meeting between JFNew, the DNR LARE biologist, and the association representative

## **2.0 Watershed and Lake Characteristics**

Watershed and lake characteristics are detailed in short form in the initial Indiana Chain of Lakes Aquatic Plant Management Plan (Weed Patrol, 2005 draft2). Additional details regarding the lakes and their watershed can also be found in the Five Lakes Watershed Management Plan (JFNew and DJCase, 2006). These details are not repeated herein with the exception of the following information which remains especially purposeful in detailing the aquatic plant community that is present within the Five Lakes and was not fully expressed in the initial aquatic plant management plan.

Residence Time: Each of the Five Lakes possess extremely short residence times. In the case of Dallas Lake, water remains in Dallas Lake for a total of 0.34 years. This means that water enters and leaves Dallas Lake every 124 days or that all of the water is replaced within Dallas Lake 2.9 times per year. The retention times for the other four lakes are shorter than those calculated for Dallas Lake. Water is replaced within Witmer Lake every 113 days, in Westler Lake every 26 days, in Messick Lake every 10 days, and in Hackenburg Lake every 3.6 days. The extremely short residence times that occur within Hackenburg and Messick Lakes suggests that sustaining herbicide application rates may be difficult within these lakes.

Lake Morphology: All of the lakes possess relatively narrow shelves upon which aquatic plants can grow. The most extreme example is in Westler Lake where water depths reach 10 feet within 10 to 15 feet of the shoreline around much of the lake. As evidenced by the bathymetric maps included in the original aquatic plant management plan, there is a very limited area for aquatic plant growth within Westler Lake. The same holds true for much of Dallas and Witmer lakes as well. Within these three lakes, aquatic plant growth is limited by the area of suitable substrate for plant colonization. In Messick and Hackenburg lakes, shelves are slightly wider than those present in Witmer, Westler, and Dallas lakes; however, plant growth in these lakes is also limited by available substrate.

**Water quality:** Water quality within the Five Lakes fluctuates with precipitation and available sunlight. The plants present in the lakes typically growth to their fullest extent through May and June, sometimes even into July, before algal blooms cause an initial die back in aquatic plant growth. Conditions observed during the spring and summer assessments indicate that once the water “turns green,” plants do not continue to grow within the main bodies of the Five Lakes. In years where water transparency is better through July and August, months when water quality is typically poorest in Indiana lakes, plant growth can become excessive in the Five Lakes. As the quality of water entering the lakes improves through watershed management and water quality improvement project implementation, the aquatic plant community should be reassessed to determined if the plant community increases in growth rate, diversity, or abundance.

### **3.0 Lake Uses**

See Indian Chain of Lakes Aquatic Plant Management Plan (Weed Patrol, draft, 2005).

### **4.0 Fisheries**

No new fisheries information is available since the initial aquatic plant management plan was written.

### **5.0 Problem Statement**

Previous aquatic plant assessments identified the presence of Eurasian watermilfoil as the primary exotic nuisance species located within the Five Lakes. This species continues to be problematic throughout the areas previously identified. However, Eurasian watermilfoil growth appears to be limited by water clarity and substrate availability. Although this plant continues to be present throughout the lakes, it is not present in such high densities as to limit recreation or use of the lakes. Efforts to control this species within areas of heavy boat traffic or high usage should occur within the next year. These lakes should be targeted for reassessment in the future to determine whether watershed improvements have positively impacted water quality within the lakes. If water quality significantly improves, then nuisance plant growth could occur throughout the growing season rather than be limited to the spring and early summer. The plant community present within the Five Lakes should be observed to determine if changes occur.

### **6.0 Vegetation Management Goals and Objectives**

The Five Lakes Conservation Association identified three management goals during the development of their initial aquatic plant management plan (Weed Patrol, 2004). These goals fit into the three goals developed by the IDNR for aquatic plant communities within Indiana lakes. As none of the goals or objectives changed based on this year's assessments; the goals are not restated here. Please refer to the Indian Lakes Chain Aquatic Plant Management Plan for more information on their goals (Weed Patrol, 2004).

### **7.0 Plant Management History**

No LARE-funded aquatic plant treatment occurred within the Five Lakes during 2006. However, several permits were issued for treatment of channels or near shore areas around the lakes. These included:

- Treatment of a total of 12.5 acres of Witmer Lake targeting coontail, sago pondweed, common elodea, filamentous algae, chara, curly-leaf pondweed, southern naiad, and Eurasian watermilfoil. Plants were treated with a combination of reward, copper sulfate, Cygnet plus, hydrathall 191, komeen, and cleargate.

- Treatment of 36.6 acres of Westler Lake targeting Eurasian watermilfoil, curly-leaf pondweed, sago pondweed, coontail, filamentous algae, chara, and naiad using reward, copper sulfate, hydrathall, Cygnet plus, komeen, and cleargate. The majority of this treatment (20 acres) occurred in one area and specifically targeted Eurasian watermilfoil and filamentous algae.
- Treatment of 24 acres of Dallas Lake. Treatment targeted coontail, large-leaf pondweed, sago pondweed, filamentous algae, chara, and curly-leaf pondweed using reward, copper sulfate, hydrathall 191, Cygnet plus, and 2,4-D.
- Within Hackenburg Lake, treatment targeted nearly 9 acres of Eurasian watermilfoil, chara, filamentous algae, and coontail using reward, copper sulfate, hydrathall 191, and Cygnet plus.
- In Messick Lake, filamentous algae, chara, coontail, and Eurasian watermilfoil were targeted for treatment on 21 acres using reward, copper sulfate, hydrathall 191, and aquathall K.

## 8.0 Aquatic Plant Community Characterization

### 8.1 Methods

JFNew surveyed the Five Lakes on June 5 and 7 and August 4, 9, and 10, 2006 according to the Indiana Department of Natural Resources sampling protocols (IDNR, 2006a; IDNR, 2006b). JFNew examined the entire littoral zone of the lake during each of the three assessments. Tier I surveys were completed on the Five Lakes occurred on June 5 and 7, 2006 and again on August 4 and 9, 2006. As defined in the Tier I protocol, the lake's littoral zone was estimated to be approximately three times the lake's Secchi disk depth. This estimate approximates the 1% light level, or the level at which light penetration into the water column is sufficient to support plant growth. Table 1 details the spring and summer Secchi disk transparencies and resultant estimated littoral zones.

**Table 1. Spring and summer transparency measurements and estimated littoral zones as determined June 5 and 7 and August 9 and 10, 2006.**

Lake	Spring Transparency	Estimated Spring Littoral Zone	Summer Transparency	Estimated Summer Littoral Zone
Witmer	3.5 feet	10.5 feet	1.2 feet	3.6 feet
Westler	4.0 feet	12 feet	2.0 feet	6.0 feet
Dallas	4.0 feet	12 feet	3.0 feet	9.0 feet
Hackenburg	6.0 feet	18 feet	3.25 feet	9.75 feet
Messick	7.5 feet	22.5 feet	3.0 feet	9.0 feet

JFNew completed one Tier II survey within each of the Five Lakes. These occurred on August 4, 9, and 10, 2006. Surveys were completed using the Tier II survey protocol updated by the IDNR LARE staff in May 2006 (IDNR, 2006b). The survey protocol generally follows previous Tier II protocols; however, the 2006 protocol requires that the sampling points be stratified over the entire depth of the lake's littoral zone. Total points sampled per stratum were determined as follows:

1. Appendix D of the IDNR protocol was consulted to determine the number of points to be sampled. This determination was based on the lake size (surface area) and trophic status.
2. Table 3 of the IDNR protocol was referenced as an indicator of the number of sample points per stratum. Table 2 (below) lists the sampling strategy for the Five Lakes.



**Table 2. Tier II sampling strategy for Big and Little Chapman Lakes using the 2006 Tier II protocol.**

Lake	Size	Trophic Status	Number of Points	Stratification of Points
Witmer Lake	204 acres	Hypereutrophic	60	50 pts 0-5 foot stratum 10 pts 5-10 foot stratum
Westler Lake	88 acres	Eutrophic	40	17 pts 0-5 foot stratum 13 pts 5-10 foot stratum 10 pts 10-15 foot stratum
Dallas Lake	283 acres	Mesotrophic	60	30 pts 0-5 foot stratum 20 pts 5-10 foot stratum 10 pts 10-15 foot stratum
Hackenburg Lake	42 acres	Eutrophic	30	10 pts 0-5 foot stratum 10 pts 5-10 foot stratum 10 pts 10-15 foot stratum
Messick Lake	68 acres	Eutrophic	40	17 pts 0-5 foot stratum 13 pts 5-10 foot stratum 10 pts 10-15 foot stratum

## 8.2 2006 Sampling Results

A spring and summer Tier I survey along with a summer Tier II survey were completed on all five lakes (Witmer, Westler, Dallas, Hackenburg, and Messick) and also on the channels connecting Dallas and Hackenburg Lakes and between Messick and Hackenburg Lakes. All surveys were conducted in 2006 by JFNew. The survey schedule for all lakes was as follows (Table 3):

**Table 3. Survey schedule of Tier I and II surveys.**

Survey	Date
Spring Tier I -Spring	June 5 <sup>th</sup> and 7 <sup>th</sup> , 2006
Summer Tier I -Summer	August 9 <sup>th</sup> and 10 <sup>th</sup> , 2006
Summer Tier II	August 4 <sup>th</sup> and August 10 <sup>th</sup> , 2006

### 8.2.1 Tier I Surveys

#### Witmer Lake

The spring and summer Tier I surveys on Witmer Lake revealed two distinct plant beds covering approximately 42 acres (Figure 1). Both plant beds were located within the littoral zone. A total of 30 plant species were observed in the spring; 35 aquatic plant species were observed during the summer survey. Emergent plant species dominated the plant bed accounting for 15 species present in the spring survey and 16 aquatic plant species present during the summer survey. Submergent vegetation was less dominant; nine species were present during the spring survey and 11 species were present during the summer survey. Non-rooted floating vegetation was present in low abundance: two species were present during the spring survey and four were identified during the summer survey. Rooted floating vegetation was also rare with three species present during both the spring and summer surveys. For the purpose of convenience, filamentous algae were treated as one individual species in the plant bed descriptions and were not keyed. A list of all of the plants identified during the spring and summer Tier I surveys for Witmer Lakes, along with the plant abundance ratings, are available in Table 4, while Appendix A contains copies of the Tier I data

sheets from the spring survey and Appendix B contains copies of the Tier I data sheets from the summer survey.

Bed 01 spans the circumference of Witmer Lake (Figure 1) and covers approximately 38 acres. All three strata (submergent, emergent, and floating plants) were represented during both the spring and summer surveys. Emergent and submergent plant species dominated Bed 01 during both surveys. In the spring survey, 10 emergent, eight submergent, three rooted floating, and two non-rooted plant species were present. In the summer survey, 13 emergent, nine submergent, four non-rooted floating, and three rooted floating plant species were identified. Filamentous algae was present during both the spring and summer surveys. Eurasian watermilfoil dominated (>60%) the plant community during the spring survey. Spatterdock and arrow arum were present in moderate abundance (2-20%). The remaining 18 plant species identified during the spring survey were all present in low abundance (<2%). During the summer survey, coontail, filamentous algae, Eurasian watermilfoil, bullhead lily, and arrow arum were all present in moderate abundance (2-21%). The remaining 25 plant species were all present in low abundance covering less than 2% of the bed's canopy. During the spring survey, the canopy was dominated by submergent vegetation (>60%) with rooted floating and emergent vegetation comprising a moderate (2-20%) portion of the canopy. Non-rooted floating vegetation was scarce in the canopy (<2%) during the spring survey. During the summer survey, submergent, non-rooted floating, and rooted floating vegetation were co-dominant covering 2-20% of the bed's canopy. Emergent vegetation covered a small portion of the canopy (<2%) during the summer survey.

Bed 02 is located in the eastern portion of Witmer Lake encircling an island (Figure 1). This bed covers approximately four acres. During the spring survey, 10 emergent, one submergent, and one non-rooted floating plant species were present. During the summer survey, nine emergent, three submergent rooted floating, and filamentous algae were present in Bed 02. Eurasian watermilfoil dominated the spring survey covering >60% of the bed's canopy, while arrow arum was present in moderate abundance (<2-20%). The remaining 10 species identified during the spring survey were present in low abundance (<2%). The canopy was dominated (>60%) by submergent species; all other strata present in low abundance (<2%) during the spring survey. During the summer survey, all 13 species were present in low abundance (<2%). This resulted in all strata covering less than 2% of the bed's canopy.

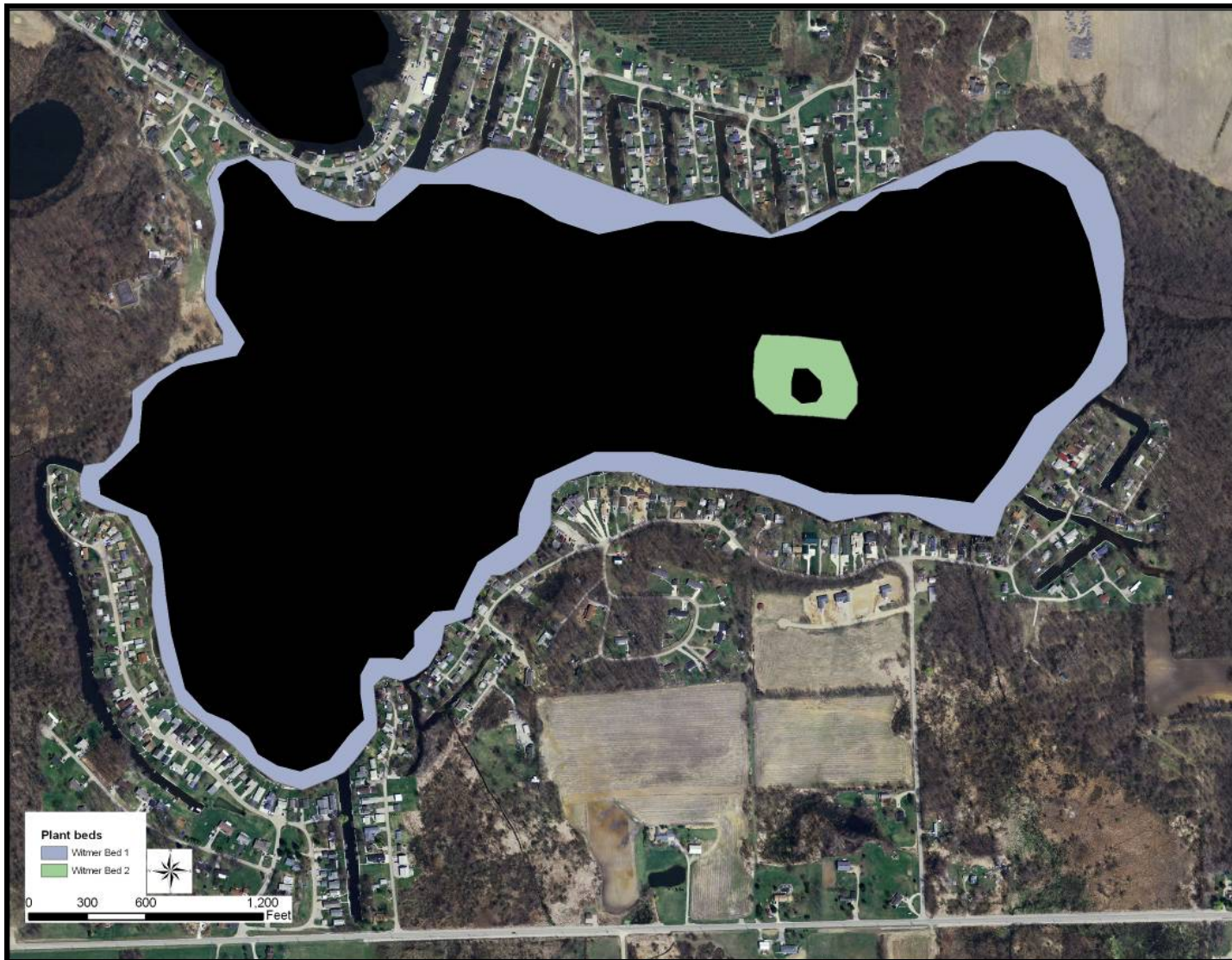


Figure 1. Plant beds identified in Witmer Lake during the spring and summer Tier I aquatic plant surveys, June 5 and August 10, 2006.

**Table 4. Witmer Lake Tier I survey results for spring and summer surveys which occurred June 5 and August 10, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Scientific Name	Common Name	Bed 1		Bed 2	
		Spring	Summer	Spring	Summer
<i>Acer saccharinum</i>	Silver maple (E)	--	<2%	<2%	<2%
<i>Asclepias incarnata</i>	Swamp milkweed (E)	--	--	<2%	<2%
<i>Cephalanthus occidentalis</i>	Buttonbush (E)	<2%	<2%	<2%	<2%
<i>Ceratophyllum demersum</i>	Coontail (S)	<2%	2-20%	--	<2%
<i>Chara species</i>	Chara (S)		<2%	--	--
<i>Cornus obliqua</i>	Blue-fruited dogwood (E)	<2%	<2%	<2%	<2%
<i>Carex stricta</i>	Common tussock sedge (E)	--	--	<2%	<2%
<i>Decodon verticillatus</i>	Whirled loosestrife (E)	--	<2%	<2%	
<i>Filamentous algae</i>	Filamentous algae (A)	<2%	2-20%	--	<2%
<i>Ilex verticillata</i>	Common winterberry (E)	--	<2%	--	--
<i>Iris virginica</i>	Blue-flag iris (E)	<2%	<2%	--	--
<i>Leersia oryzoides</i>	Rice cutgrass (E)	--	<2%	--	--
<i>Lemna minor</i>	Common duckweed (NF)	<2%	<2%	<2%	--
<i>Lemna trisulca</i>	Star duckweed (NF)	--	<2%	--	--
<i>Lythrum salicaria</i>	Purple loosestrife (E)	<2%	<2%	<2%	<2%
<i>Myriophyllum exalbescent</i>	Northern watermilfoil (S)	--	<2%	--	--
<i>Myriophyllum heterophyllum</i>	Two-leaf watermilfoil (S)	--	<2%	--	--
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil (S)	>60%	2-20%	>60%	<2%
<i>Nuphar advena</i>	Spatterdock (RF)	2-20%	<2%	--	--
<i>Nuphar variegatum</i>	Bullhead lily (RF)	<2%	2-20%	--	--
<i>Nymphaea tuberosa</i>	White water lily (RF)	<2%	<2%	--	--
<i>Peltandra virginica</i>	Arrow arum (E)	2-20%	2-20%	2-20%	<2%
<i>Phalaris arundinacea</i>	Reed canary grass (E)	<2%	<2%	--	--
<i>Polygonum amphibium stipulaceum</i>	Water knotweed (E)	--	--	<2%	<2%
<i>Pontedaria cordata</i>	Pickerel weed (E)	<2%	--	--	--
<i>Polygonum coccineum</i>	Water heartsease (S)	--	--	--	<2%
<i>Potamogeton amplifolius</i>	Large-leaf pondweed (S)	<2%	<2%	--	--
<i>Potamogeton crispus</i>	Curly-leaf pondweed (S)	<2%	--	--	--
<i>Potamogeton foliosus</i>	Narrow-leaf pondweed (S)	<2%	<2%	--	--
<i>Potamogeton gramineus</i>	Grass-leaf pondweed (S)	--	<2%	--	--
<i>Potamogeton pectinatus</i>	Sago pondweed (S)	<2%	<2%	--	--
<i>Potamogeton illinoensis</i>	Illinois pondweed (S)	<2%	--	--	--
<i>Rosa palustris</i>	Swamp rose (E)	--	--	--	<2%
<i>Saururus cernuus</i>	Lizard's tail (E)	--	--	<2%	--
<i>Scirpus acutus</i>	Hard-stemmed bulrush (E)	<2%	<2%	--	--
<i>Scirpus pungens</i>	Chairmaker's bulrush (E)	<2%	<2%	--	--
<i>Spirodela polyrrhiza</i>	Large duckweed (NF)	<2%	<2%	--	--
<i>Typha latifolia</i>	Broad-leaved cattail (E)	<2%	<2%	--	--
<i>Wolffia columbiana</i>	Water meal (NF)	--	<2%	--	--
<i>Zannichellia palustris</i>	Horned pondweed (S)	<2%	--	--	--



## Westler Lake

One plant bed bordered Westler Lake's shoreline during both the spring and summer surveys. The bed covers approximately 17 acres (Figure 2). The entire plant bed was located within the littoral zone. A total of 22 plant species were observed during the spring survey, while 29 plant species were observed during the summer survey. Submergent and emergent plant species dominated the plant communities observed during both the spring and summer surveys. During the spring survey, submergent and emergent plant species were co-dominant with eight species present within each strata. During the summer survey, 11 submergent and 13 emergent plant species were present. Non-rooted and rooted floating plant species were present in low abundance during both the spring and summer surveys. During the spring survey, three rooted and two non-rooted floating plant species were present. Three rooted and one non-rooted floating plant species were present during the summer survey. During the spring and summer surveys, filamentous algae were present. A list of all of the plants identified during the spring and summer surveys on Westler Lake along with the plant abundance ratings are available in Table 5, while Appendix A contains copies of the spring Tier I data sheets and Appendix B contains copies of the summer Tier I data sheets.

Eurasian watermilfoil was dominant (21-60%) during the spring survey but decreased to a moderate abundance (2-20%) during the summer survey. Coontail and arrow arum were present in moderate abundance (2-20%) during both surveys. Filamentous algae, spatterdock, grass-leaf pondweed, and Illinois pondweed were present in low abundance (<2%) during the spring survey, but were present in moderate abundance (2-20%) during the summer survey. In contrast, large-leaf pondweed and bullhead lily were present in moderate abundance (2-20%) during the spring survey, but were present in low abundance (<2%) during the summer survey. The remaining plant species present during the spring and summer surveys did not individually exceed a two percent abundance rating.

During the spring survey, the canopy was dominated by submergent vegetation (>60%). Rooted floating vegetation was present in high abundance (21-60%), emergent vegetation was present in moderate abundance (2-20%), and non-rooted floating vegetation was present in low abundance (<2%). During the summer survey, submergent, rooted floating, and emergent vegetation were each present in moderate abundance (2-20%). Non-rooted floating vegetation was present in low abundance (<2%).





Figure 2. Plant beds identified in Westler Lake during the spring and summer surveys, June 5 and August 10, 2006.

**Table 5. Westler Lake Tier I survey results for spring and summer surveys which occurred June 5 and August 9, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Scientific Name	Common Name	Bed 1	
		Spring	Summer
<i>Acer saccharinum</i>	Silver maple (E)	--	<2%
<i>Asclepias incarnata</i>	Swamp milkweed (E)	--	<2%
<i>Cephalanthus occidentalis</i>	Buttonbush (E)	<2%	<2%
<i>Ceratophyllum demersum</i>	Coontail (S)	2-20%	2-20%
<i>Cornus obliqua</i>	Blue-fruited dogwood (E)	<2%	<2%
<i>Filamentous algae</i>	Filamentous algae (A)	<2%	2-20%
<i>Iris virginica</i>	Blue-flag iris (E)	<2%	--
<i>Lemna minor</i>	Common duckweed (NF)	<2%	<2%
<i>Lippia lanceolata</i>	Fog fruit (E)	--	<2%
<i>Lysimachia nummularia</i>	Moneywort (E)	--	<2%
<i>Lythrum salicaria</i>	Purple loosestrife (E)	--	<2%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil (S)	21-60%	2-20%
<i>Najas flexilis</i>	Slender naiad (S)	--	--
<i>Najas guadalupensis</i>	Southern naiad (S)	--	<2%
<i>Nuphar advena</i>	Spatterdock (RF)	<2%	2-20%
<i>Nuphar variegatum</i>	Bullhead lily (RF)	2-20%	<2%
<i>Nymphaea tuberosa</i>	White water lily (RF)	<2%	<2%
<i>Peltandra virginica</i>	Arrow arum (E)	2-20%	2-20%
<i>Phalaris arundinacea</i>	Reed canary grass (E)	<2%	<2%
<i>Polygonum coccineum</i>	Water heartsease (S)	--	<2%
<i>Polygonum lapathifolium</i>	Heartsease (S)	--	<2%
<i>Pontedaria cordata</i>	Pickernel weed (E)	<2%	<2%
<i>Potamogeton amplifolius</i>	Large-leaf pondweed (S)	2-20%	<2%
<i>Potamogeton crispus</i>	Curly-leaf pondweed (S)	<2%	--
<i>Potamogeton gramineus</i>	Grass-leaved pondweed (S)	<2%	2-20%
<i>Potamogeton illinoensis</i>	Illinois pondweed (S)	<2%	2-20%
<i>Potamogeton nodosus</i>	Long-leaf pondweed (S)	--	<2%
<i>Potamogeton pectinatus</i>	Sago pondweed (S)	<2%	<2%
<i>Scirpus acutus</i>	Hard-stem bulrush (E)	<2%	<2%
<i>Scirpus pungens</i>	Chairmaker's rush (E)	--	<2%
<i>Spirodela polyrrhiza</i>	Large duckweed (NF)	<2%	--
<i>Typha angustifolia</i>	Narrow-leaved cattail (E)	--	--
<i>Typha X glauca</i>	Blue cattail (E)	--	<2%
<i>Typha latifolia</i>	Broad-leaved cattail (E)	<2%	<2%
<i>Zannichellia palustris</i>	Horned pondweed (S)	<2%	--

## **Dallas Lake**

The spring and summer Tier I surveys on Dallas Lake revealed twelve distinct plant beds covering approximately 67 acres (Figure 3). All plant beds were located within the littoral zone. A total of 35 plant species were observed in the spring survey, while 41 plant species were observed during the summer survey. Submergent and emergent plant species dominated the plant beds within Dallas Lake during both surveys. Submergent species accounted for 15 of the 35 species found in the spring survey and 18 of the 41 species present during the summer survey. Emergent species accounted for 16 of the 35 species found in the spring survey and 19 of the 41 species identified during the summer survey. Two rooted floating plant species and one non-rooted floating plant species was found during both the spring and summer surveys. For the purpose of convenience, filamentous algae are treated as one individual species in the plant bed descriptions and are not keyed. A list of all of the plants identified during the spring and summer Tier I surveys on Dallas Lake along with the plant abundance ratings are available in Tables 6 and 7 while Appendices A and B contain copies of the Tier I data sheets for the spring and summer surveys, respectively.

Bed 01 is located along the southern shoreline of Dallas Lake immediately west of the channel connecting Dallas Lake with Westler Lake (Figure 3). Bed 01 covers approximately 5.4 acres. This bed contained a total of eight species during the spring survey and 11 species during the summer survey; all three strata (submerged, emergent, and floating plants) were represented in both surveys. Submergent species dominated Bed 01 during the spring survey with Eurasian watermilfoil, sago pondweed, grass-leaf pondweed, and filamentous algae all present in moderate abundance (2-20%). All other species covered less than 2% of the canopy. All species possessed low canopy cover during the summer survey. Table 6 details plants identified during the spring and summer survey. During the spring survey, submergent vegetation covered 2-20% of the plant bed canopy, while rooted floating, non-rooted floating, and emergent vegetation covered less than 2% of the plant bed canopy. During the summer survey, plants representing all strata (submergent, non-rooted floating, rooted floating, and emergent vegetation) each covered less than 2% of the plant bed canopy.

Bed 02 is located immediately west of Bed 01 along the southern shoreline of Dallas Lake (Figure 3) and covers approximately 1.6 acres. This bed contained a total of six plant species during the spring survey and eleven species during the summer survey. All three strata (submerged, emergent, and floating plants) were represented in both surveys. The spring survey revealed four submergent, one emergent, and one rooted floating species. All were present in low abundance (<2%). During the summer survey, submergent species dominated the bed with Eurasian water milfoil, Illinois pondweed, and grass-leaf pondweed all present in moderate abundance (2-20%). All other species were present in low abundance (<2%). During the spring survey, plants representing all strata covered less than 2% of the canopy. During the summer survey, submergent vegetation dominated the canopy covering 21-60%, while rooted floating vegetation comprised 2-20%, and emergent and non-rooted floating vegetation covered less than 2% of the plant bed canopy.



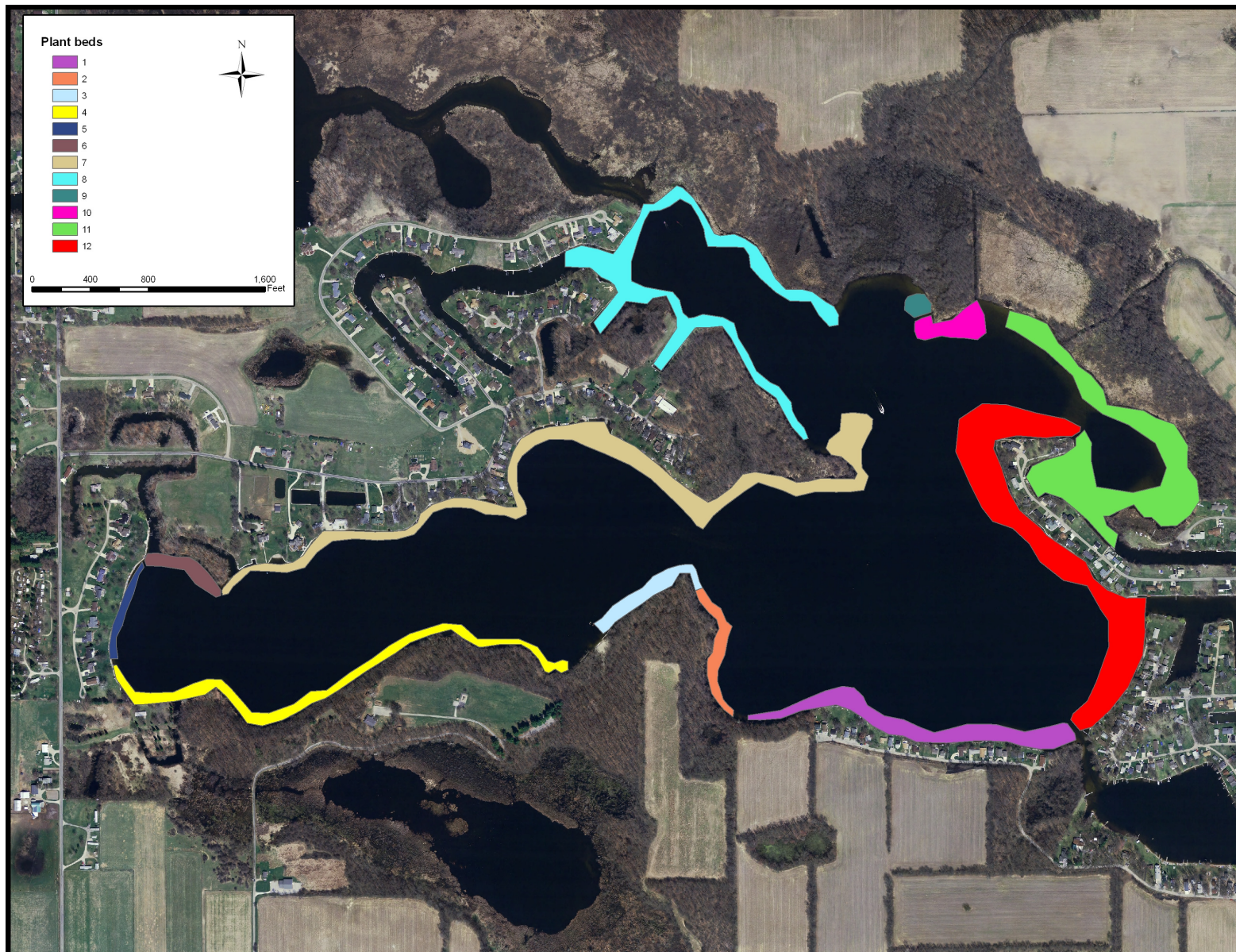


Figure 3. Plant beds identified in Dallas Lake during the spring and summer Tier I surveys, June 5 and August 10, 2006.

**Table 6. Dallas Lake Tier I Beds 1 through 6 survey results for spring and summer surveys which occurred June 7 and August 9, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Common Name	Bed 1		Bed 2		Bed 3		Bed 4		Bed 5		Bed 6	
	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer
Silver maple (E)	--	--	--	<2%	<2%	<2%	--	<2%	--	--	--	--
Buttonbush (E)	--	--	--	--	--	--	--	<2%	--	--	--	--
Coontail (S)	--	<2%	--	--	--	--	<2%	<2%	--	<2%	<2%	2-20%
Chara species (S)	<2%	<2%	--	--	<2%	<2%	2-20%	<2%	--	--	--	--
Blue-fruited dogwood (E)	--	--	--	--	--	<2%	<2%	<2%	--	--	--	--
Filamentous algae (A)	2-20%	<2%	--	2-20%	<2%	<2%	2-20%	<2%	<2%	--	--	--
Green ash (E)	--	--	--	--	<2%	<2%	--	--	--	--	--	--
Water star grass (S)	--	--	--	--	--	--	<2%	2-20%	--	--	--	--
Various-leaved water milfoil (S)	--	--	--	<2%	--	--	<2%	--	--	--	--	--
Eurasian watermilfoil (S)	2-20%	<2%	<2%	2-20%	<2%	2-20%	21-60%	2-20%	<2%	<2%	21-60%	2-20%
Southern naiad (S)	--	<2%	--	--	--	--	--	<2%	--	--	--	--
Spatterdock (RF)	<2%	<2%	--	<2%	--	--	2-20%	<2%	<2%	--	2-20%	<2%
White water lily (RF)	--	--	<2%	<2%	<2%	--	<2%	<2%	<2%	<2%	--	--
Arrow arum (E)	--	<2%	--	--	<2%	--	2-20%	2-20%	<2%	<2%	<2%	2-20%
Reed canary grass (E)	<2%	<2%	<2%	--	<2%	<2%	<2%	<2%	--	--	--	<2%
Common reed (E)	--	--	--	--	--	--	<2%	<2%	--	--	--	--
Sycamore (E)	--	--	--	--	--	--	--	<2%	--	--	--	--
Pickrel weed (E)	--	--	--	--	--	--	<2%	<2%	--	--	--	--
Large-leaf pondweed (S)	--	--	--	<2%	--	--	<2%	<2%	--	--	<2%	--
Curly-leaf pondweed (S)	--	--	--	--	--	--	21-60%	--	<2%	--	21-60%	--
Grass-leaf pondweed (S)	2-20%	<2%	<2%	2-20%	<2%	<2%	2-20%	--	<2%	<2%	--	--
Illinois pondweed (S)	<2%	<2%	<2%	2-20%	<2%	2-20%	<2%	2-20%	<2%	<2%	--	2-20%
Long-leaf pondweed (S)	--	--	--	<2%	--	--	--	--	--	--	--	--
Sago pondweed (S)	2-20%	<2%	<2%	<2%	<2%	<2%	2-20%	<2%	<2%	<2%	<2%	<2%
Fern pondweed (S)	--	--	--	--	--	--	<2%	<2%	<2%	--	2-20%	<2%
Flat-stem pondweed (S)	--	--	--	--	--	--	<2%	--	--	--	--	--
Hard-stem bulrush (E)	--	--	--	--	--	--	2-20%	2-20%	--	--	--	--
Chairmaker's rush (E)	--	--	--	--	--	--	--	--	--	<2%	--	--



Common Name	Bed 1		Bed 2		Bed 3		Bed 4		Bed 5		Bed 6	
	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer
Narrow-leaved cattail (E)	--	--	--	--	--	--	<2%	<2%	--	--	--	--
Horned pondweed (S)	--	--	--	--	--	--	<2%	--	--	--	--	--

**Table 7. Dallas Lake Tier I Bed 7 through 12 survey results for spring and summer surveys which occurred June 7 and August 9, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Common Name	Bed 7		Bed 8		Bed 9		Bed 10		Bed 11		Bed 12	
	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer
Silver maple (E)	<2%	<2%	--	<2%	--	<2%	<2%	<2%	<2%	<2%	--	--
Swamp milkweed (E)	--	<2%	--	--	--	--	--	--	--	--	--	--
Blue joint grass (E)	--	--	--	<2%	--	--	--	--	--	--	--	--
Buttonbush (E)	--	<2%	<2%	<2%	<2%	<2%	--	<2%	<2%	<2%	--	--
Coontail (S)	<2%	<2%	--	2-20%	--	--	--	<2%	<2%	2-20%	--	<2%
Chara species (S)	--	--	--	--	--	--	--	--	21-60%	<2%	--	--
Blue-fruited dogwood (E)	--	<2%	<2%	<2%	<2%	<2%	--	--	<2%	<2%	--	--
Whirled loosestrife (E)	--	--	<2%	<2%	--	--	--	--	<2%	<2%	--	--
Rush species (E)	<2%	--	--	--	--	--	--	--	--	--	--	--
Filamentous algae (A)	--	2-20%	2-20%	21-60%	--	<2%	--	--	2-20%	21-60%	2-20%	21-60%
Green ash (E)	--	--	--	<2%	--	--	--	--	--	--	--	--
Water star grass (S)	--	--	--	2-20%	--	--	--	--	<2%	--	--	--
Blue-flag iris (E)	<2%	<2%	<2%	<2%	--	--	--	--	--	--	--	--
Common duckweed (NF)	--	--	--	--	--	--	--	--	<2%	<2%	--	<2%
Purple loosestrife (E)	--	<2%	--	--	--	--	--	--	--	--	--	<2%
Various-leaved watermilfoil (S)	--	<2%	<2%	<2%	--	--	--	--	<2%	<2%	<2%	<2%
Eurasian watermilfoil (S)	21-60%	21-60%	21-60%	2-20%	--	--	2-20%	2-20%	21-60%	21-60%	2-20%	2-20%
Southern naiad (S)	--	--	--	<2%	--	--	--	--	<2%	--	<2%	<2%
Spiny naiad (S)	--	--	--	<2%	--	<2%	--	--	--	2-20%	--	--
Spatterdock (RF)	2-20%	<2%	2-20%	2-20%	--	--	2-20%	<2%	2-20%	2-20%	2-20%	<2%
White water lily (RF)	<2%	<2%	<2%	2-20%	--	<2%	<2%	2-20%	2-20%	2-20%	--	<2%
Arrow arum (E)	<2%	2-20%	<2%	2-20%	--	--	--	<2%	--	<2%	<2%	<2%

Common Name	Bed 7		Bed 8		Bed 9		Bed 10		Bed 11		Bed 12	
	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer
Reed canary grass (E)	<2%	<2%	<2%	<2%	<2%	<2%	<2%	<2%	<2%	<2%	--	--
Common reed (E)	--	--	<2%	<2%	--	--	--	--	--	--	--	--
Sycamore (E)	--	<2%	--	--	--	--	--	--	--	--	--	--
Water heartsease (E)	--	--	--	<2%	--	--	--	--	--	<2%	--	--
Pickereel weed (E)	--	<2%	--	--	--	--	--	--	--	--	--	--
Large-leaf pondweed (S)	<2%	--	<2%	--	--	--	--	--	--	--	--	<2%
Broad-leaf small pondweed (S)	--	--	--	--	--	--	--	--	<2%	<2%	--	--
Curly-leaf pondweed (S)	2-20%	--	<2%	--	--	--	--	--	2-20%	--	--	--
Grass-leaf pondweed (S)	2-20%	<2%	2-20%	<2%	--	<2%	--	<2%	2-20%	<2%	--	2-20%
Illinois pondweed (S)	<2%	2-20%	<2%	2-20%	--	<2%	<2%	--	2-20%	2-20%	<2%	2-20%
Long-leaf pondweed (S)	--	<2%	--	--	--	--	--	--	--	<2%	--	--
Sago pondweed (S)	2-20%	<2%	<2%	--	2-20%	<2%	<2%	<2%	2-20%	2-20%	2-20%	2-20%
Fern pondweed (S)	--	--	2-20%	2-20%	--	--	--	--	--	--	--	--
Hard-stem bulrush (E)	<2%	<2%	<2%	<2%	--	<2%	--	<2%	<2%	<2%	--	<2%
Olney's bulrush (E)	<2%	--	--	--	--	--	--	--	--	--	--	--
Chairmaker's rush (E)	--	<2%	--	<2%	--	--	--	--	--	--	--	<2%
Narrow-leaved cattail (E)	<2%	<2%	<2%	<2%	--	<2%	--	--	<2%	<2%	--	<2%
Blue cattail (E)	--	--	--	--	--	--	--	--	--	<2%	--	--
Broad-leaved cattail (E)	<2%	<2%	--	<2%	--	<2%	--	--	--	--	--	--
Humped bladderwort (S)	--	--	--	--	--	--	--	--	--	21-60%	--	--
Eel grass (S)	--	--	--	--	--	--	--	--	--	--	--	<2%
Horned pondweed (S)	--	--	<2%	--	--	--	--	--	<2%	--	--	--

Bed 03 is located along the southern shoreline of Dallas Lake (Figure 3). Bed 03 covers approximately 1.8 acres. During the spring survey, the bed contained 11 species, while 10 species were present during the summer survey. During the spring survey, all species were present in low abundance (<2%). The same was true for most species during the summer survey. The exceptions were Eurasian watermilfoil and Illinois pondweed, which were present in moderate abundance (2-20%). JFNew identified five submergent, four emergent, one rooted floating plant species, and filamentous algae during the spring survey. During the summer survey, four submergent species, five emergent species, and filamentous algae were present. Submergent, rooted floating, and emergent vegetation each covered less than 2% of the canopy during the spring survey, while non-rooted floating vegetation was entirely absent. During the summer survey, Bed 03 was dominated by submerged vegetation, which covered 21-60% of the canopy. Representatives from all other strata covered less than 2% of the bed's canopy. Non-rooted floating vegetation was absent from this bed.

Bed 04 is located along the southwestern shoreline of Dallas Lake (Figure 3) and covers approximately 5 acres. This bed contained a total of 24 plant species during the spring survey and 23 plant species during the summer survey. All three strata (submergent, emergent, and floating plants) were represented during both surveys. Submerged vegetation dominated the community during the spring survey with 13 species identified. In the summer survey, emergent species dominated the community with 11 of the 23 identified species. During the spring survey, curly-leaf pondweed and Eurasian watermilfoil were moderately abundant (21-60%); chara species, filamentous algae, spatterdock, arrow arum, hard-stem bulrush, sago pondweed, and grass-leaf pondweed were moderately abundant (2-20%). The remaining 16 species were present in low abundance (<2%). During the summer survey, hard-stemmed bulrush, Eurasian watermilfoil, arrow arum, Illinois pondweed, and water star grass were all present in moderate abundance (2-20%). The remaining 18 species were present in low abundance (<2%). During the spring survey, submergent vegetation covered more than 60% of the plant bed canopy, rooted floating and non-rooted floating vegetation each comprised 2-20% of the plant bed canopy, and non-rooted floating vegetation covered less than 2% of the canopy. During the summer survey, submergent vegetation again dominated the plant community covering 21-60% of the canopy. Rooted floating and emergent vegetation were present in moderate abundance (2-20%) and non-rooted floating vegetation was present in low abundance (<2%).

Bed 05 is located along the western shoreline of Dallas Lake (Figure 3) and is the second smallest bed on the lake covering approximately 0.8 acres. This bed contained a total of 10 species during the spring survey and eight species during the summer survey. All three strata (submerged, emergent, and floating plants) were represented in both surveys. The spring survey revealed six submergent, one emergent, two floating species, and filamentous algae all present in low abundance (<2%). During the summer survey, five submergent, two emergent, and one rooted floating plant species were present in Bed 05 in low abundance (<2%). During the spring and summer surveys, the canopy representatives from all strata were present in low abundance (less than 2% each).

Bed 06 is located along the western shoreline of Dallas Lake (Figure 3). Bed 06 covers approximately 1.2 acres. During both the spring and summer surveys, the bed contained eight species. Eurasian watermilfoil and curly-leaf pondweed dominated (21-60%) the canopy during the spring survey, while spatterdock and Robbin's pondweed were less dominant (2-20%). The remaining four species were present in low abundance (<2%) during the spring survey. Coontail, Eurasian watermilfoil, arrow arum, and sago pondweed were present in moderate abundance (2-

20%) during the summer survey; the remaining four species were present in low abundance covering <2% of the canopy. Six submergent, one emergent, and one rooted floating species were present during the spring survey, while five submergent, two emergent, and one rooted floating species were present during the summer survey. The canopy was dominated (>60%) by submergent plant species during the spring survey, while rooted floating plant species were present in moderate abundance (2-20%) and non-rooted floating and emergent vegetation were present in low abundance (<2%). During the summer survey, submerged vegetation was present in a moderate abundance (21-60%), while floating and emergent vegetation was present at a low abundance (<2%).

Bed 07 is located along the northern shoreline of Dallas Lake (Figure 3) and covers the longest stretch of shoreline of any of the beds on Dallas Lake. The bed covers approximately 12.2 acres. Bed 07 contained a total of 18 species during the spring survey and 24 species during the summer survey; all three strata (submerged, emergent, and floating plants) were represented during both surveys (Table 7). During the spring survey, 11 emergent, six submergent, and one rooted floating species were present in the plant bed. During the summer survey, 16 emergent, six submergent, one floating species, and filamentous algae were present. During both the spring and summer surveys, Eurasian watermilfoil was the most abundant species (21-60%). Spatterdock, curly-leaf pondweed, sago pondweed, and grass-leaf pondweed were present in moderate abundance (2-20%) in the spring survey. The remaining 11 species were present in low abundance (<2%). During the summer survey, Illinois pondweed, arrow arum, and filamentous algae were present in moderate abundance (2-20%). The remaining 20 species were present in low abundance (<2%). In the spring survey, the canopy was dominated by submergent plants (2-20%), while all other strata covered less than 2% of the canopy during the spring survey. During the summer survey, the canopy was also dominated by submergent plant species (21-60%), while emergent plant species covered 2-20% of the canopy. Floating vegetation comprised less than 2% of the canopy bed.

Bed 08 is located along the northern shoreline of Dallas Lake (Figure 3) just south of the channel to Hackenburg Lake. This bed covers about 9.6 acres. This bed contained a total of 21 species during the spring survey and 27 species during the summer survey. All three strata (submergent, emergent, and floating plants) were represented in both surveys. The spring survey revealed nine submergent, ten emergent, and one rooted floating species. During the summer survey, 17 emergent, eight submergent, one rooted floating species, and filamentous algae were present in Bed 08. Eurasian watermilfoil dominated (21-60%) the bed during the spring survey, while spatterdock, Robbin's pondweed, grass-leaf pondweed, and filamentous algae were present in moderate abundance (2-20%). The remaining 16 plant species were present in low abundance (<2%). During the summer survey, Filamentous algae was present in high abundance (21-60%) and coontail, water star grass, Eurasian watermilfoil, spatterdock, white water lily, arrow arum, Robbin's pondweed, and Illinois pondweed were all present in moderate abundance (2-20%). The remaining 18 plant species were all present in low abundance (<2%). During both the spring and summer surveys, submergent vegetation covered the largest portion of the bed (21-60%), with rooted floating vegetation covering 2-20% and non-rooted floating and emergent vegetation covering <2% of the canopy. Emergent vegetation comprised less than 2% of the canopy during the spring survey but increased in density to cover 2-20% of the canopy during the summer survey.

Bed 09 is located along the northern shoreline of Dallas Lake (Figure 3) and is the smallest of the plants beds identified in Dallas Lake covering only 0.5 acres. During the spring survey, the bed contained four plant species (three emergent and one submergent species), while 13 plant species were identified during the summer survey. More emergent and submergent species were identified

during the summer survey than those found during the spring survey. All species identified during both surveys were present in low abundance (<2%) with the exception of sago pondweed, which was moderately abundant (2-20%) during the spring survey. Floating species (non-rooted and rooted) and emergent species covered less than 2% of the bed's canopy during both surveys. Submergent plant species covered 2-20% of the canopy during the spring survey and less than 2% of the canopy during the summer survey.

Bed 10 covers approximately 1.8 acres and is located along the northern shoreline of Dallas Lake (Figure 3) just east of Bed 09. Bed 10 contained a total of seven species during the spring survey and 11 species during the summer survey (Table 7). All three strata (submerged, emergent, and floating plants) were represented in both surveys. During the spring survey, four submergent, two emergent, and two rooted floating species were present in Bed 10. During the summer survey, six emergent, three submergent, and two rooted floating species were present. Eurasian watermilfoil and spatterdock were present in moderate abundance (2-20%) during the spring survey. The remaining five plant species identified during the spring survey were present in low abundance (<2%). During the summer survey, Eurasian watermilfoil and white water lily were present in moderate abundance (2-20%), while the remaining nine species were present in low abundance (<2%). During both the spring and summer surveys, submergent and rooted floating vegetation each covered 2-20% of the canopy, while non-rooted floating and emergent vegetation covered less than 2% of the canopy.

Bed 11 is located along the eastern shoreline of Dallas Lake (Figure 3) and covers approximately 12.6 acres. Bed 11 contained a total of 23 species during the spring survey and 25 species during the summer survey. All three strata (submerged, emergent, and floating plants) were represented during both surveys. During the spring survey, 10 submergent, nine emergent, two rooted floating, one non-rooted floating species, and filamentous algae were present in the plant bed. During the summer survey, 11 submergent, 10 emergent, two rooted floating, one non-rooted floating species, and filamentous algae were identified. During the spring survey, Eurasian watermilfoil and chara were the most abundant species (21-60%), while spatterdock, white water lily, curly-leaf pondweed, grass-leaf pondweed, Illinois pondweed, and sago pondweed were present in moderate abundance (2-20%). The remaining 15 species identified during the spring survey were all present in low abundance (<2%). During the summer survey, Eurasian watermilfoil, humped bladderwort, and filamentous algae were all present in high abundance (21-60%). Sago pondweed, Illinois pondweed, white water lily, spatterdock, spiny naiad, and coontail were less abundant (2-20%). The remaining 16 species present during the summer survey were all present in low abundance (<2%). During the spring and summer surveys, submerged vegetation dominated the canopy (>60%), while non-rooted floating vegetation was present in low abundance (<2%). Rooted floating vegetation was present in high abundance (21-60%) during the summer survey. It was present in a lower abundance during the spring survey (2-20%). Emergent vegetation also displayed this trend with a lower abundance in the canopy in the spring survey (<2%) as compared with the summer survey (2-20%).

Bed 12 is located along the eastern shoreline of Dallas Lake (Figure 3) and covers approximately 14.4 acres. Bed 12 contained a total of eight species during the spring survey and 18 species during the summer survey. All three strata (submerged, emergent, and floating plants) were represented in each survey. During the spring survey, five submergent, one emergent, one rooted floating plant species, and filamentous algae were present in the plant bed. During the summer survey, eight submergent, six emergent, two rooted floating, one non-rooted floating species, and filamentous algae were present. During the spring survey, Eurasian watermilfoil, spatterdock, sago pondweed,



and filamentous algae were all present in moderate abundance (2-20%), while the remaining four species were present in low abundance (<2%). During the summer survey, filamentous algae were present in high abundance (21-60%) while Eurasian watermilfoil, grass-leaf pondweed, Illinois pondweed, and sago pondweed were all present in moderate abundance (2-20%). The remaining 13 species were all present in low abundance (<2%). During both the spring and summer surveys, the submergent vegetation covered 2-20% of the canopy and non-rooted floating and emergent vegetation covered <2% of the bed's canopy. Rooted floating vegetation covered 2-20% of the canopy during the spring survey, but covered less than 2% of the canopy during the summer survey.

### **Dallas-Hackenburg Channel**

The channel connecting Dallas Lake to Hackenburg Lake contained one plant bed that spans the length and width of the channel. All three strata (submerged, emergent, and floating plants) were represented in both Tier I surveys (Table 8). During the spring survey, eight submergent, seven emergent, three rooted floating, and two non-rooted plant species were present. During the summer survey, 11 submergent, 10 emergent, and three rooted floating plant species were identified. During the spring survey, Eurasian watermilfoil and spatterdock were present in high abundance (21-60%). Coontail, chara, white water lily, arrow arum, and large-leaf pondweed were present in moderate abundance (2-20%). The remaining 14 species were present in low abundance (<2%). During the summer survey, Eurasian watermilfoil and Illinois pondweed was present in high abundance (21-60%). Coontail, filamentous algae, spatterdock, bullhead lily, white water lily, and sago pondweed were present in moderate abundance (2-20%). The remaining 17 species were present in low abundance (<2%). During both surveys, the abundance of canopy vegetation remained the same: the canopy was dominated by submergent and rooted floating vegetation (21-60%); emergent vegetation was present in moderate abundance (2-20%); and non-rooted vegetation was scarce (<2%).

**Table 8. Tier I survey results for spring and summer surveys of the channel connecting Dallas and Hackenburg lakes which occurred June 5 and August 10, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Scientific Name	Common Name	Bed 1	
		Spring	Summer
<i>Asclepias incarnata</i>	Swamp milkweed (S)		<2%
<i>Cephalanthus occidentalis</i>	Buttonbush (E)	<2%	<2%
<i>Ceratophyllum demersum</i>	Coontail (S)	2-20%	2-20%
<i>Chara species</i>	Chara species (S)	2-20%	<2%
<i>Decodon verticillatus</i>	Whirled loosestrife (S)	<2%	<2%
<i>Filamentous algae</i>	Filamentous algae (A)	<2%	2-20%
<i>Heteranthera dubia</i>	Water star grass (E)		<2%
<i>Lemna minor</i>	Common duckweed (NF)	<2%	
<i>Myriophyllum heterophyllum</i>	Various-leaved water milfoil (S)		<2%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil (S)	21-60%	21-60%
<i>Najas marina</i>	Spiny naiad (S)		<2%
<i>Nuphar advena</i>	Spatterdock (RF)	21-60%	2-20%
<i>Nuphar variegatum</i>	Bullhead lily (RF)	<2%	2-20%
<i>Nymphaea tuberosa</i>	White water lily (RF)	2-20%	2-20%
<i>Peltandra virginica</i>	Arrow arum (S)	2-20%	<2%
<i>Phalaris arundinacea</i>	Reed canary grass (E)	<2%	<2%
<i>Phragmites australis</i>	Common reed (E)		<2%
<i>Polygonum coccineum</i>	Water heartsease (S)		<2%
<i>Pontedaria cordata</i>	Pickrel weed (E)		<2%
<i>Potamogeton robbinsii</i>	Robbin's pondweed (S)		<2%
<i>Potamogeton amplifolius</i>	Large-leaf pondweed (S)	2-20%	<2%
<i>Potamogeton crispus</i>	Curly-leaf pondweed (S)	<2%	
<i>Potamogeton illinoensis</i>	Illinois pondweed (S)	<2%	21-60%
<i>Potamogeton pectinatus</i>	Sago pondweed (S)	<2%	2-20%
<i>Scirpus acutus</i>	Hard-stemmed bulrush (E)	<2%	<2%
<i>Spirodela polyrrhiza</i>	Large duckweed (NF)	<2%	
<i>Typha angustifolia</i>	Narrow-leaved cattail (E)	<2%	<2%
<i>Typha latifolia</i>	Broad-leaved cattail (E)	<2%	<2%
<i>Zannichellia palustris</i>	Horned pondweed (S)	<2%	

## Hackenburg Lake

The spring and summer Tier I surveys on Hackenburg Lake revealed one plant bed which borders the entire shoreline of the lake (Figure 4). The entire plant bed is located within the littoral zone. In Hackenburg Lake, a total of 29 plant species were observed in the spring, while 42 were observed in the summer. Submergent and emergent plant species dominated the plant beds in Hackenburg Lake. Submergent species accounted for 13 of the species found in the spring survey, while 17 submergent species were found in the summer survey. Emergent species accounted for 11 species during the spring survey and 19 species identified during the summer survey. One non-rooted floating plant was found in the spring survey while two were found in the summer survey. For the purpose of convenience, filamentous algae are treated as one individual species in the plant bed descriptions and not keyed. A list of all of the plants identified during the spring and summer Tier I surveys on Hackenburg Lake along with the plant abundance ratings are available in Table 9, while Appendix A contains copies of the Tier I data sheets for the spring survey and Appendix B contains copies of the summer plant survey data sheets.

One plant bed spans the circumference of Hackenburg Lake (Figure 4) and covers approximately 17 acres. All three strata (submergent, emergent, and floating plants) were represented during both surveys. During the spring survey, 13 submergent, 11 emergent, three rooted floating, and one non-rooted floating plant species were present. During the summer survey, 19 emergent, 17 submergent, three rooted floating, and two rooted non-floating plant species were present. Filamentous algae dominated the community during the spring survey (>60%). Coontail, Eurasian watermilfoil, spatterdock, and curly-leaf pondweed were also present in high abundance (21-60%). In addition, white water lily, arrow arum, large-leaf pondweed, Illinois pondweed, and sago pondweed were all present in moderate abundance (2-21%). The remaining 19 species covered small (<2%) portions of the canopy. In the summer survey, coontail was dominant (>60%), while filamentous algae, common duckweed, and fog fruit were present in high abundance (21-60%). Eurasian watermilfoil, spatterdock, white water lily, arrow arum, large-leaf pondweed, grass-leaf pondweed, Illinois pondweed, sago pondweed, common bladderwort, and water meal were all moderately abundant (2-20%) during the summer survey. The remaining 28 species were sparse in abundance covering less than 2% of the canopy. During both surveys, the canopy was dominated by submergent vegetation (>60%) with rooted floating vegetation present in high abundance (21-60%) and emergent vegetation present in moderate abundance (2-20%). Non-rooted floating vegetation was sparse covering less than 2% of the canopy during the spring survey but was more abundant covering 21-60% of the canopy during the summer survey.

**Table 9. Hackenburg Lake Tier I survey results for spring and summer surveys which occurred June 5 and August 10, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Scientific Name	Common name	Bed 1	
		Spring	Summer
<i>Acer saccharinum</i>	Silver maple (E)	--	<2%
<i>Cephalanthus occidentalis</i>	Buttonbush (E)	<2%	<2%
<i>Ceratophyllum demersum</i>	Coontail (E)	21-60%	>60%
<i>Chara species</i>	Chara species (S)	<2%	<2%
<i>Cicuta bulbifera</i>	Bulblet-bearing water hemlock (E)	--	<2%
<i>Cornus obliqua</i>	Blue-fruited dogwood (E)	<2%	<2%

Scientific Name	Common name	Bed 1	
		Spring	Summer
<i>Cuscuta species</i>	Dodder species (E)	--	<2%
<i>Decodon verticillatus</i>	Whirled loosestrife (E)	<2%	<2%
<i>Filamentous algae</i>	Filamentous algae (A)	>60%	21-60%
<i>Fraxinus pennsylvanica</i>	Green ash (E)	--	<2%
<i>Leersia oryzoides</i>	Rice cutgrass (E)	--	<2%
<i>Iris virginica</i>	Blue-flag iris (E)	<2%	--
<i>Lemna minor</i>	Common duckweed (NF)	<2%	21-60%
<i>Lippia lanceolata</i>	Fog fruit (E)	--	<2%
<i>Lytbrum salicaria</i>	Purple loosestrife (E)	--	<2%
<i>Myriophyllum heterophyllum</i>	Various-leaved water milfoil (S)	<2%	<2%
<i>Myriophyllum spicatum</i>	Eurasian water milfoil (S)	21-60%	2-20%
<i>Najas flexilis</i>	Slender naiad (S)	--	<2%
<i>Najas guadalupensis</i>	Southern naiad (S)	--	<2%
<i>Najas marina</i>	Spiny naiad (S)	--	<2%
<i>Nuphar advena</i>	Spatterdock (RF)	21-60%	2-20%
<i>Nuphar variegatum</i>	Bullhead lily (RF)	<2%	<2%
<i>Nymphaea tuberosa</i>	White water lily (RF)	2-20%	2-20%
<i>Peltandra virginica</i>	Arrow arum (E)	2-20%	2-20%
<i>Phalaris arundinacea</i>	Reed canary grass (E)	<2%	<2%
<i>Polygonum hydropiperoides</i>	Mild water pepper (S)	--	<2%
<i>Pontedaria cordata</i>	Pickrel weed (S)	<2%	<2%
<i>Potamogeton amplifolius</i>	Large-leaved pondweed (S)	2-20%	2-20%
<i>Potamogeton berchtoldii</i>	Broad-leaved small pondweed (S)	<2%	<2%
<i>Potamogeton crispus</i>	Curly leaf pondweed (S)	21-60%	<2%
<i>Potamogeton gramineus</i>	Grass-leaved pondweed (S)	--	2-20%
<i>Potamogeton illinoensis</i>	Illinois pondweed (S)	2-20%	2-20%
<i>Potamogeton nodosus</i>	Long-leaved pondweed (S)	<2%	--
<i>Potamogeton pectinatus</i>	Sago pondweed (S)	2-20%	2-20%
<i>Potamogeton pusillus</i>	Small pondweed (S)	<2%	<2%
<i>Potamogeton robbinsii</i>	Robbin's pondweed (S)	--	<2%
<i>Salix nigra</i>	Black willow (E)	<2%	--
<i>Sagittaria latifolia</i>	Common arrowhead (E)	--	<2%
<i>Scirpus acutus</i>	Hard-stemmed bulrush (E)	<2%	<2%
<i>Scirpus validus</i>	Soft-stem bulrush (E)	--	<2%
<i>Sparganium species</i>	Burreed species (E)	--	<2%
<i>Typha angustifolia</i>	Narrow-leaved cattail (E)	<2%	<2%
<i>Typha latifolia</i>	Broad-leaved cattail (E)	<2%	<2%
<i>Utricularia vulgaris</i>	Common bladderwort (S)	<2%	2-20%
<i>Wolffia columbiana</i>	American water meal (NF)	--	2-20%
<i>Zannichellia palustris</i>	Horned pondweed (S)	<2%	--



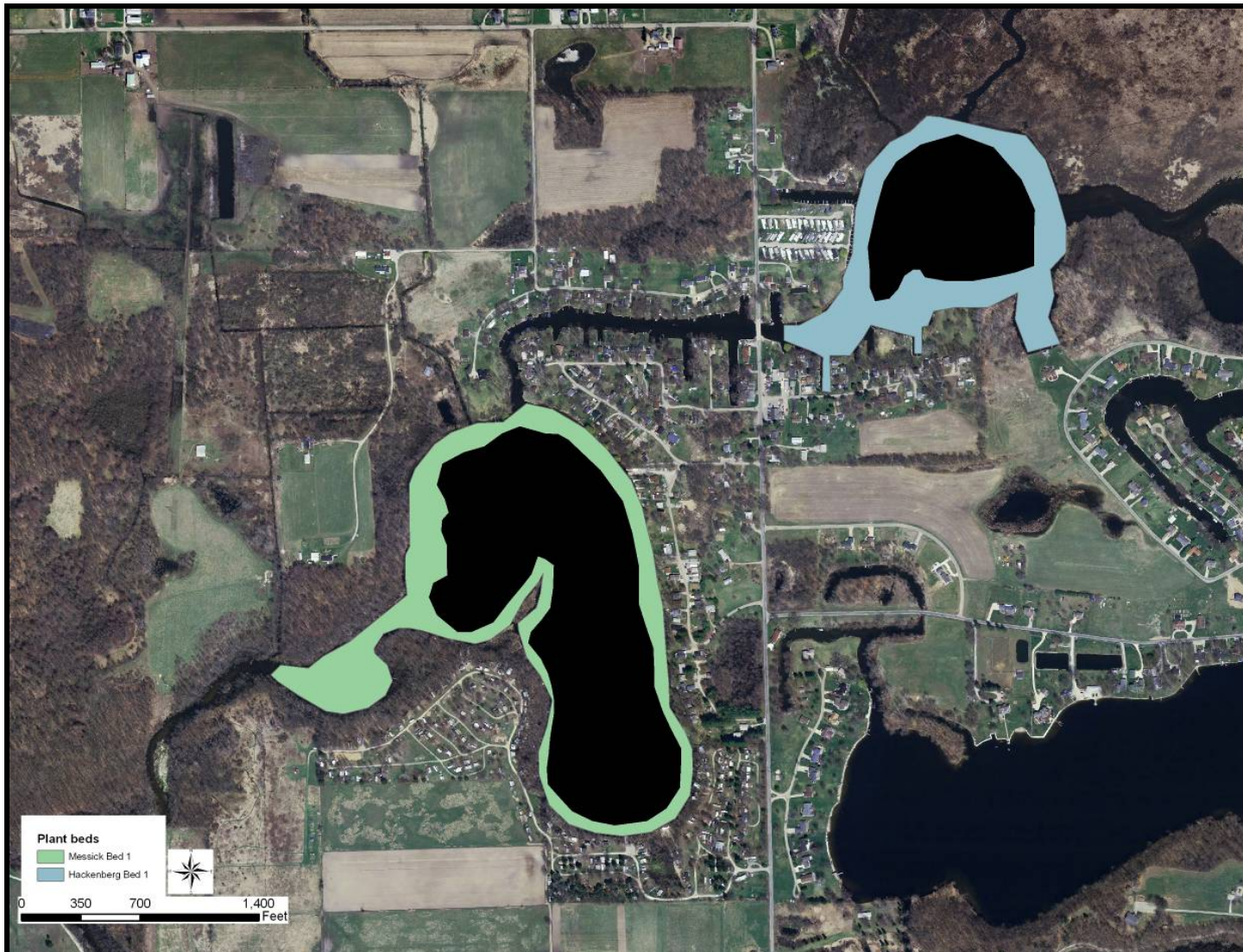


Figure 4. Plant beds identified within Hackenberg and Messick Lakes during spring and summer Tier I surveys, June 5 and August 10, 2006.

### Messick-Hackenburg Channel

The Channel connecting Hackenburg and Messick Lakes contains one plant bed that spans the length and width of the channel. All three strata (submergent, emergent, and floating plants) were represented in both surveys (Table 10). During the spring survey, 13 emergent, eight submergent, two rooted floating, and one non-rooted plant species were present. During the summer, 13 emergent, nine submergent, one rooted floating, and one non-rooted floating plant species were identified. Filamentous algae and spatterdock were present in high abundance (21-60%) during the spring survey. Coontail, Eurasian watermilfoil, white water lily, Illinois pondweed, and curly-leaf pondweed were present in moderate abundance (2-20%) during this assessment. The remaining 17 species were present in low abundance (<2%). During the summer survey, filamentous algae and white water lily dominated the plant community covering 21-60%. Coontail, whirled loosestrife, Eurasian watermilfoil, and arrow arum were present in moderate abundance (2-20%). The remaining 19 species were present in low abundance (<2%). During the spring survey, the canopy was dominated by rooted floating vegetation (21-60%); submergent and emergent vegetation was less dominant (2-20%), and non-rooted floating vegetation was sparse (<2%). During the summer survey, the canopy was dominated by submergent and rooted floating vegetation (21-60%); emergent vegetation was present in moderate abundance (2-20%) and non-rooted vegetation was sparse (<2%).

**Table 10. Tier I survey results for spring and summer surveys of the channel connecting Hackenburg and Messick lakes which occurred June 5 and August 10, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Scientific Name	Common Name	Bed 1	
		Spring	Summer
<i>Cephalanthus occidentalis</i>	Buttonbush (E)	<2%	<2%
<i>Ceratophyllum demersum</i>	Coontail (S)	2-20%	2-20%
<i>Chara species</i>	Chara species (S)	<2%	--
<i>Cornus obliqua</i>	Blue-fruited dogwood (E)	<2%	<2%
<i>Decodon verticillatus</i>	Whirled loosestrife (E)	<2%	2-20%
<i>Filamentous algae</i>	Filamentous algae (A)	21-60%	21-60%
<i>Heteranthera dubia</i>	Water star grass (E)	<2%	--
<i>Iris virginica</i>	Blue-flag iris (E)	<2%	<2%
<i>Leersia oryzoides</i>	Rice cutgrass (E)	--	<2%
<i>Lemna minor</i>	Common duckweed (NF)	<2%	<2%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil (S)	2-20%	2-20%
<i>Najas flexilis</i>	Slender naiad (S)	--	<2%
<i>Najas marina</i>	Spiny naiad (S)	--	<2%
<i>Nuphar advena</i>	Spatterdock (RF)	21-60%	--
<i>Nymphaea tuberosa</i>	White water lily (RF)	2-20%	21-60%
<i>Peltandra virginica</i>	Arrow arum (E)	2-20%	2-20%
<i>Phalaris arundinacea</i>	Reed canary grass (E)	<2%	<2%
<i>Polygonum hydropiperoides</i>	Mild water pepper (S)	--	<2%
<i>Pontederia cordata</i>	Pickrel weed (S)	<2%	<2%
<i>Potamogeton amplifolius</i>	Large-leaf pondweed (S)	<2%	--
<i>Potamogeton berchtoldii</i>	Broad-leaf small pondweed (S)	<2%	<2%

Scientific Name	Common Name	Bed 1	
		Spring	Summer
<i>Potamogeton crispus</i>	Curly-leaf pondweed (S)	2-20%	--
<i>Potamogeton illinoensis</i>	Illinois pondweed (S)	2-20%	<2%
<i>Potamogeton pectinatus</i>	Sago pondweed (S)	<2%	<2%
<i>Scirpus acutus</i>	Hard-stem bulrush (E)	<2%	<2%
<i>Scirpus fluviatilis</i>	River bulrush (E)	<2%	<2%
<i>Sparganium eurycarpum</i>	Common burreed (E)	<2%	<2%
<i>Typha X glauca</i>	Blue cattail (E)	--	<2%
<i>Typha angustifolia</i>	Narrow-leaved cattail (E)	<2%	<2%
<i>Typha latifolia</i>	Broad-leaved cattail (E)	<2%	--
<i>Utricularia vulgaris</i>	Common bladderwort (S)	--	<2%

### Messick Lake

The spring and summer Tier I surveys on Messick Lake revealed one plant bed that rings the entire shoreline of Messick Lake (Figure 4). The entire plant bed was located within the littoral zone. In Messick Lake, a total of 31 plant species were observed in the spring while 32 were observed in the summer (Table 11). Submergent and emergent plant species dominated the plant beds. Submergent species accounted for 13 of the species found in the spring survey and 12 of the species found in the summer survey. Emergent species accounted for 13 and 14 of the plant species found in the spring and summer surveys, respectively. Only three rooted floating plant species were found within Messick Lake during the spring and summer surveys; no non-rooted floating species were identified within Messick Lake during the spring survey. Two non-rooted floating plant species were found during the summer survey. For the purpose of convenience, filamentous algae are treated as one individual species in the plant bed descriptions and not keyed. A list of all of the plants identified during the spring and summer Tier I surveys on Messick Lake along with the plant abundance ratings are available in Table 10, while Appendix A contains copies of the Tier I data sheets for the spring survey and Appendix B contains copies of the summer plant survey data sheets.

One aquatic plant bed spans the circumference of Messick Lake (Figure 4). Aquatic plants cover approximately 22 acres of Messick Lake. All three strata (submergent, emergent, and floating plants) were represented in both surveys. During the spring survey, 13 submergent, 13 emergent, and three rooted floating plant species were present. During the summer survey, 14 emergent, 12 submergent, three rooted floating, and two non-rooted floating plant species were identified. Coontail was present in high abundance (21-60%) during both the spring and summer surveys. Eurasian watermilfoil was prevalent in the spring survey covering 21-60% of the plant bed but was less abundant during the summer survey covering 2-20% of the plant bed. In contrast, filamentous algae was present in high abundance during the summer survey (21-60%) but was relatively sparse during the spring survey (<2%). Spatterdock, white water lily, arrow arum, large-leaf pondweed, curly-leaf pondweed, Illinois pondweed, and sago pondweed were all present in moderate abundance (2-20%) during the spring survey. The remaining 22 species were present in low abundance (<2%). During the summer survey, whirled loosestrife, spiny naiad, spatterdock, white water lily, arrow arum, curly-leaf pondweed, and grass-leaf pondweed were all present in moderate abundance (2-20%). The remaining 22 species were present in low abundance covering less than 2% of the plant bed. In the spring survey, submergent vegetation dominated the community in Messick Lake covering >60% of the bed. Rooted floating vegetation covered 21-60% of the bed, while emergent vegetation less abundant (2-20%). Non-rooted floating vegetation was sparse covering less than 2% of the plant



bed. During the summer survey, submergent vegetation (21-60%) again dominated the community (21-60%). Rooted and emergent vegetation were both present in moderate abundance (2-20%), while non-rooted floating vegetation was scarce (<2%).

**Table 11. Messick Lake Tier I survey results for spring and summer surveys which occurred June 7 and August 10, 2006. Emergent plant species are tagged with (E), submergent with (S), rooted floating with (RF), non-rooted floating with (NF), and algae with (A).**

Scientific Name	Common Name	Bed 1	
		Spring	Summer
<i>Acer saccharinum</i>	Silver maple (E)	--	<2%
<i>Cephalanthus occidentalis</i>	Buttonbush (E)	<2%	<2%
<i>Ceratophyllum demersum</i>	Coontail (S)	21-60%	21-60%
<i>Chara species</i>	Chara species (S)	<2%	<2%
<i>Cornus obliqua</i>	Blue-fruited dogwood (E)	<2%	--
<i>Carex stricta</i>	Common tussock sedge (E)	<2%	<2%
<i>Decodon verticillatus</i>	Whirled loosestrife (E)	<2%	2-20%
<i>Elodea nuttallii</i>	Slender waterweed (S)	<2%	--
<i>Filamentous algae</i>	Filamentous algae (A)	<2%	21-60%
<i>Heteranthera dubia</i>	Water star grass (E)	--	<2%
<i>Iris virginica</i>	Blue-flag iris (E)	<2%	<2%
<i>Lemna minor</i>	Common duckweed (F)	--	<2%
<i>Lythrum salicaria</i>	Purple loosestrife (E)	<2%	<2%
<i>Myriophyllum exalbescent</i>	Spiked water milfoil (S)	--	<2%
<i>Myriophyllum spicatum</i>	Eurasian water milfoil (S)	21-60%	2-20%
<i>Najas flexilis</i>	Slender naiad (S)	<2%	--
<i>Najas guadalupensis</i>	Southern naiad (S)	<2%	<2%
<i>Najas marina</i>	Spiny naiad (S)	--	2-20%
<i>Nuphar advena</i>	Spatterdock (F)	2-20%	2-20%
<i>Nuphar variegatum</i>	Bullhead lily (RF)	<2%	<2%
<i>Nymphaea tuberosa</i>	White water lily (RF)	2-20%	2-20%
<i>Peltandra virginica</i>	Arrow arum (E)	2-20%	2-20%
<i>Phalaris arundinacea</i>	Reed canary grass (E)	<2%	<2%
<i>Pontedaria cordata</i>	Pickerel weed (E)	<2%	<2%
<i>Potamogeton amplifolius</i>	Large-leaf pondweed (S)	2-20%	<2%
<i>Potamogeton berchtoldii</i>	Broad-leaf small pondweed (S)	<2%	<2%
<i>Potamogeton crispus</i>	Curly leaf pondweed (S)	2-20%	2-20%
<i>Potamogeton gramineus</i>	Grass-leaf pondweed (S)	<2%	2-20%
<i>Potamogeton illinoensis</i>	Illinois pondweed (S)	2-20%	<2%
<i>Potamogeton pectinatus</i>	Sago pondweed(S)	2-20%	--
<i>Potamogeton robbinsii</i>	Robbin's pondweed (S)	--	<2%
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed (S)	<2%	--
<i>Salix interior</i>	Sandbar willow (E)	<2%	--
<i>Scirpus acutus</i>	Hard-stem bulrush (E)	--	<2%
<i>Scirpus pungens</i>	Chairmaker's rush (E)	<2%	<2%
<i>Sparganium eurycarpum</i>	Common burreed (E)	<2%	<2%
<i>Typha angustifolia</i>	Narrow-leaved cattail (E)	<2%	<2%
<i>Typha latifolia</i>	Broad-leaved cattail (E)	<2%	--
<i>Wolffia columbiana</i>	American water meal (NF)	--	<2%



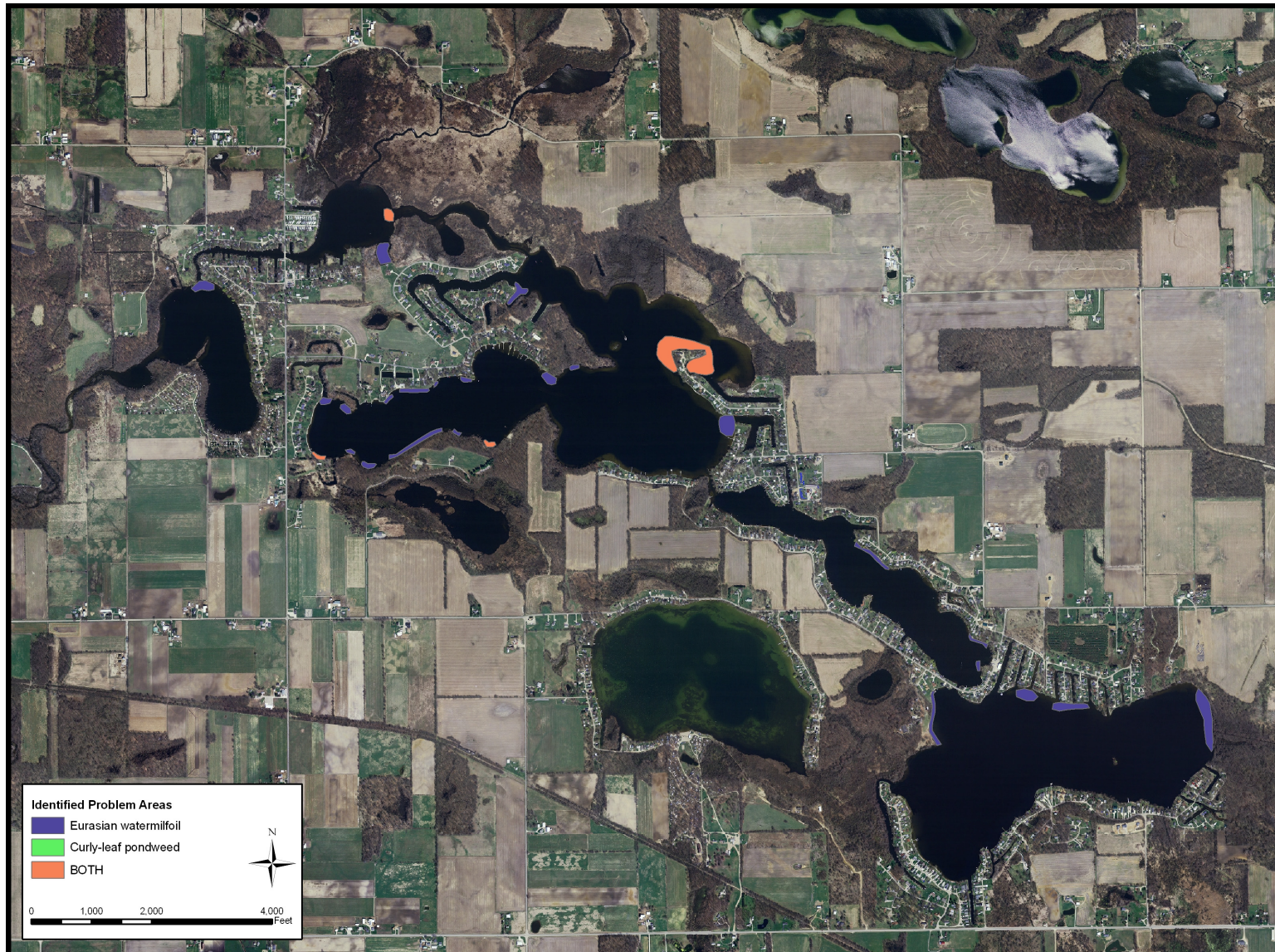
### **Five Lakes Plant Community Summary**

Eurasian watermilfoil occurred in high abundance in Witmer Lake while arrow arum, bullhead lily, spatterdock, coontail, and filamentous algae were present in moderate abundance. The remaining plant species present in Witmer Lake were present in low abundance. The two plant beds present in Witmer Lake extend from their respective shoreline out into the lake at distances ranging from 100-200 feet. Eurasian watermilfoil occurs around nearly the entire lake; however, densities vary with location. Several areas were mapped as containing relatively dense Eurasian watermilfoil growth during the spring survey (Figure 5). Increased water depth, poor water clarity, and algal growth limited the plant community density and diversity during the summer plant survey. Based on this assessment, JFNew determined that plant growth is typically limited by water quality. When peak usage periods occur, aquatic plant growth within the main body of Witmer Lake is declining. This balance limits the need for aquatic herbicide to reduce Eurasian watermilfoil populations within Witmer Lake.

The plant species in Westler Lake that occurs in greatest abundance is Eurasian watermilfoil. However, Eurasian watermilfoil growth is limited by the narrow shelf available around the margin of the lakeshore. Coontail and arrow arum were present in moderate abundance in both Tier I surveys on Westler Lake. The plant bed, which encircles Westler Lake, is relatively narrow and extends out into the lake at variable distances ranging from 25-125 feet. Like Witmer Lake, Westler Lake possessed several areas that were mapped as possessing dense Eurasian watermilfoil communities during the spring assessment. However, poor transparency, algal growth, and water depth limited plant growth during the summer assessment. Again, data suggest that Eurasian watermilfoil growth is controlled by water clarity and limited control through herbicide application is necessary at this time.

The main plant species occurring in Dallas Lake is Eurasian watermilfoil. Other plant species present in high abundance and frequency include: spatterdock, white water lily, arrow arum, curly-leaf pondweed, grass-leaf pondweed, Illinois pondweed, and sago pondweed. The plant beds hug the shoreline and extend out into the lake at variable distances ranging from 50-300 feet. Several problem areas are located throughout the lake (Figure 5). Eurasian watermilfoil is present in dense patches throughout Dallas Lake. No particular pattern is apparent in the growth of this species. Like lakes upstream of Dallas Lake in the Five Lakes Chain, water clarity limits the growth of Eurasian watermilfoil during the summer peak usage period within Dallas Lake. Only those areas deemed as heavy boating areas where Eurasian watermilfoil is a nuisance or could easily or rapidly spread to other portions of the lake should be considered for treatment at this time.

The main plant species occurring in Hackenburg Lake are coontail and filamentous algae. Other plant species present in high abundance and frequency in both Tier I surveys include: Eurasian watermilfoil, spatterdock, white water lily, arrow arum, large-leaf pondweed, curly-leaf pondweed, Illinois pondweed, and sago pondweed. The plant beds hug the shoreline and extend out into the lake at variable distances ranging from 50-300 feet. A problem area is located in the southeastern lobe of the lake and at the mouth of the channel connecting Hackenburg Lake with Dallas Lake where Eurasian watermilfoil is relatively dense (Figure 5). Only the area where boating through the bed could cause nuisance conditions within the Five Lakes is recommended for treatment at this time.



**Figure 5. Dense curly-leaf pondweed and Eurasian watermilfoil locations identified within the Five Lakes during the 2006 assessments.**



The main plant species occurring in Messick Lake is coontail. Other plant species present in high abundance and frequency in both surveys include: Eurasian watermilfoil, filamentous algae, spatterdock, white water lily, arrow arum, curly-leaf pondweed, and Illinois pondweed. The plant bed hugs the shoreline and extends out into the lake at variable distances ranging from 50-300 feet. The plant bed fills the entire southwestern lobe of Messick Lake. A problem area is located along the center of the northern shoreline where Eurasian watermilfoil is particularly dense within Messick Lake (Figure 5). However, like the other lakes in the Five Lakes Chain, water clarity, water depth, and algal growth limited Eurasian watermilfoil density within Messick Lake during the summer survey. This results in limited Eurasian watermilfoil growth which makes the use of herbicide unnecessary at this time.

Overall, plant growth within the Five Lakes is relatively dense in the spring. Aquatic plants generally cover much of the shoreline of all five lakes. Growth is typically limited by the width of available substrate located within the littoral zone. This is especially true within Witmer, Westler, and Dallas lakes. Each of these lakes possesses a narrow shelf upon which plants can grow. Plants typically colonize all available surfaces early in the spring and grow to peak densities in June or July. However, densities decline as water quality become poorer. When clarity declines and algal densities increase, aquatic plants within the Five Lakes are shaded out and are therefore unable to photosynthesize. When this occurs, plants drop out of the water column and densities become much more sparse. This is readily apparent when looking at the 2006 Tier I data. Submergent plant densities typically declined from the spring to summer surveys. This is especially true within Witmer Lake where plants were rated as dense (>60% canopy cover) during the spring assessment, but covered less than 2% of the canopy during the summer assessment.

### **8.2.2 Tier II**

The Tier II surveys occurred on Witmer, Westler, and Dallas lakes on August 4, 2006 and on Hackenburg and Messick lakes on August 10, 2006. Figure 6 shows the locations where points were sampled within all five lakes. Figures 7 and 8 identify locations of exotic species, including Eurasian watermilfoil (Figure 7) and curly-leaf pondweed (Figure 8) found during the Tier II sampling events. Raw data are included in Appendix C.

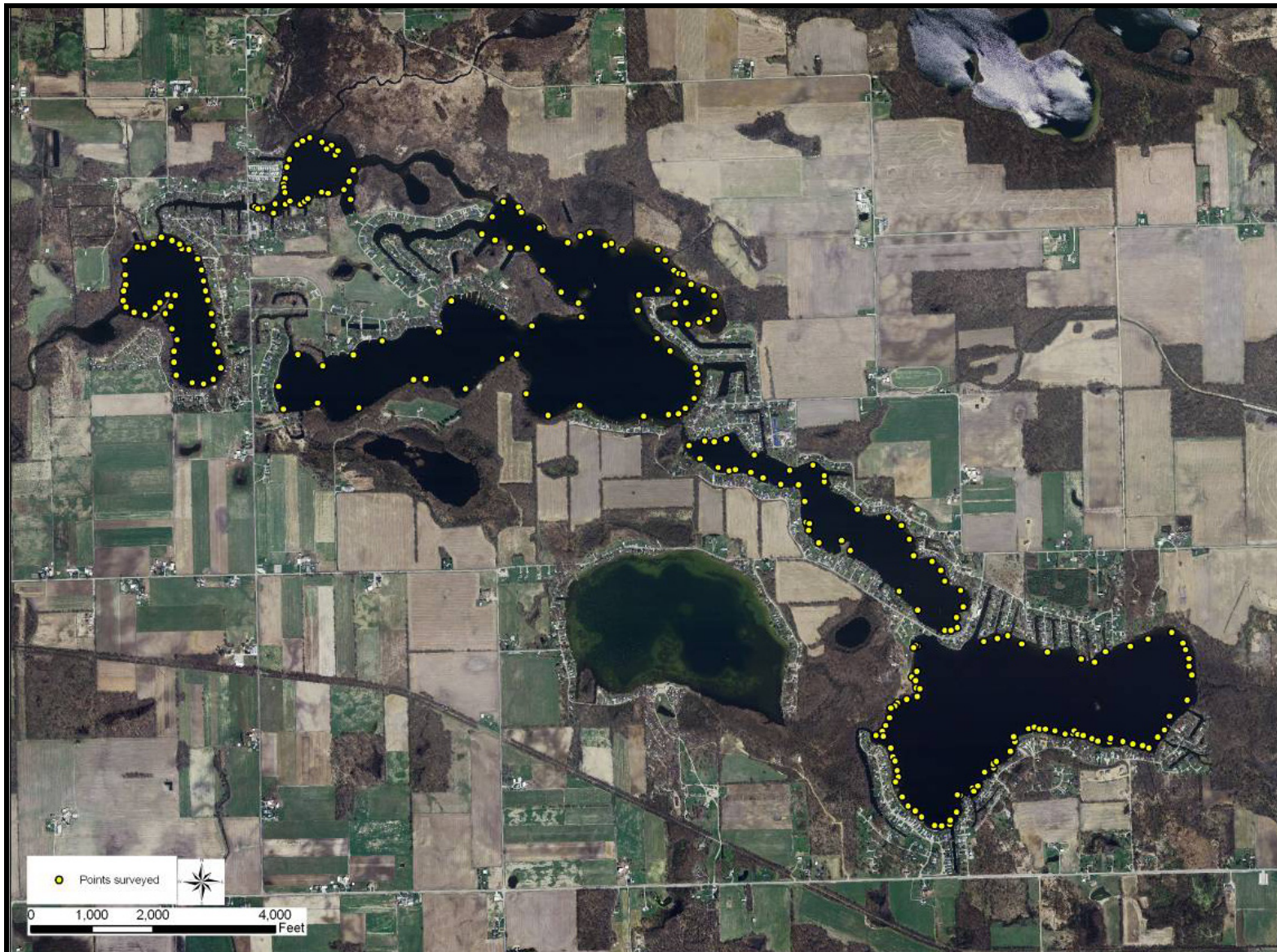


Figure 6. Locations sampled during the Five Lakes Tier II survey as sampled which occurred on August 4 and 10, 2006.



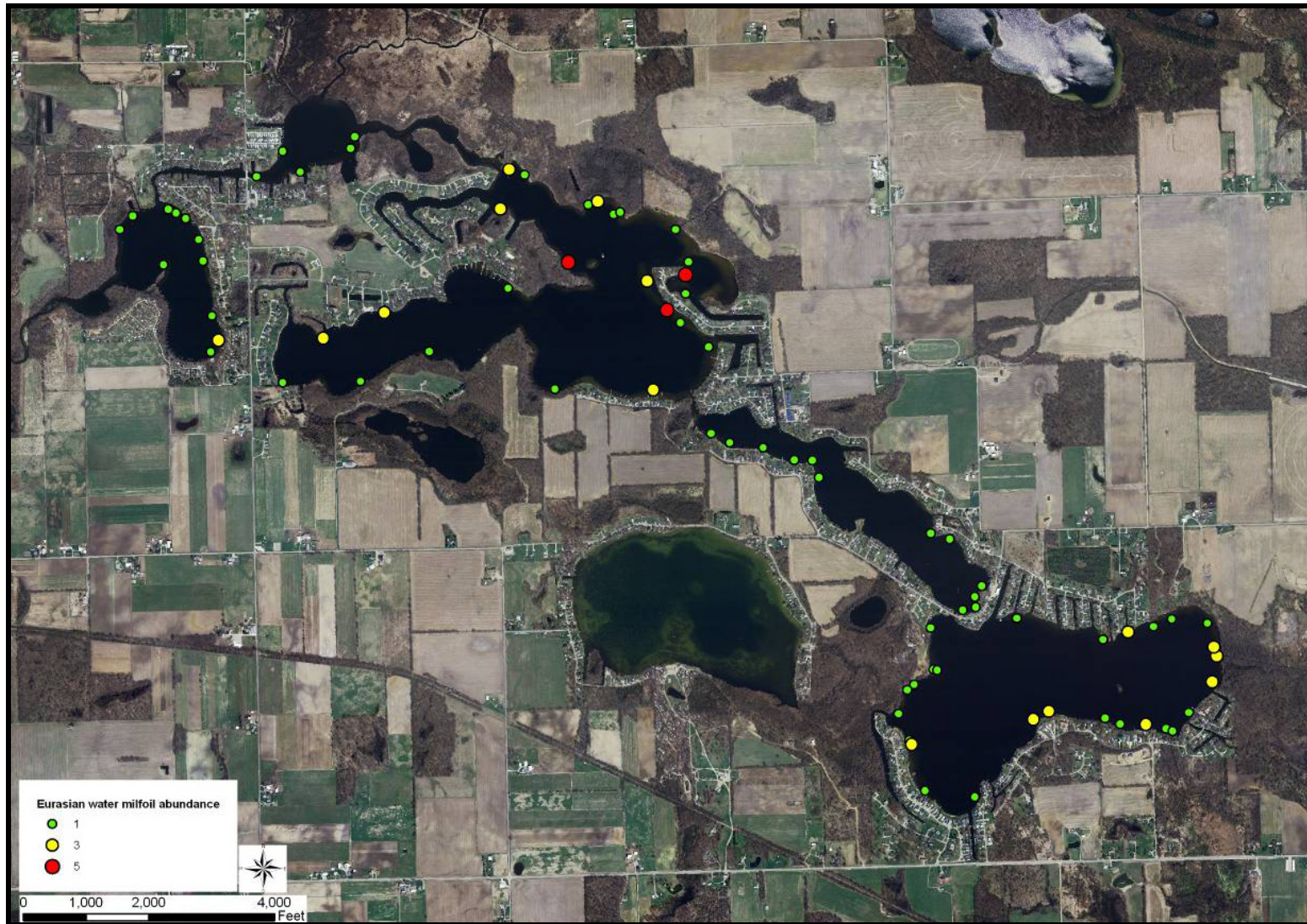


Figure 7. Eurasian watermilfoil locations in the Five Lakes as sampled during the Tier II surveys which occurred on August 4 and 10, 2006.



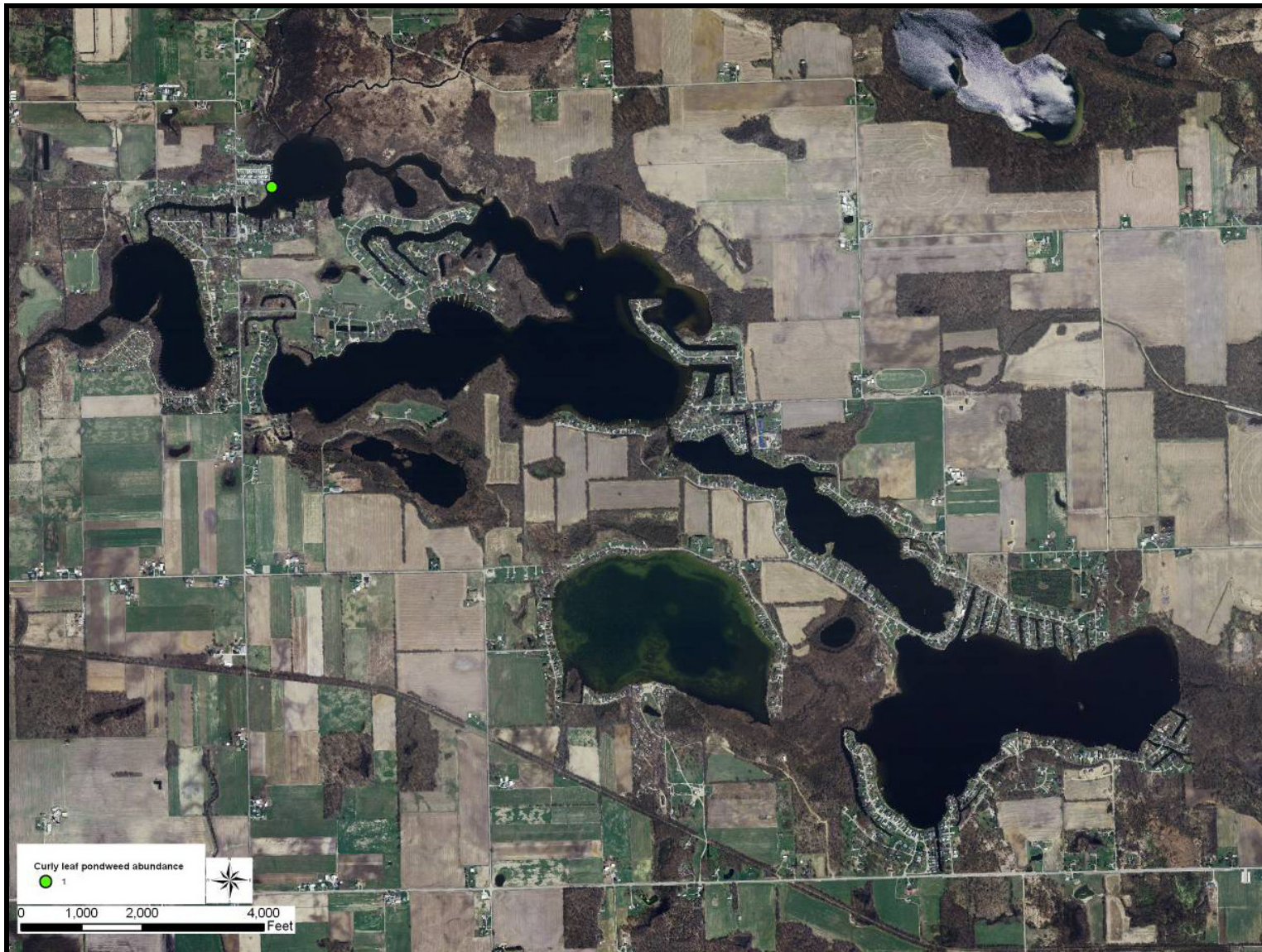


Figure 8. Curly-leaf pondweed locations identified as sampled during the Tier II surveys which occurred on August 4 and 10, 2006.

## **Witmer Lake**

JFNew conducted the Tier II survey on Witmer Lake on August 4, 2006. Transparency was measured using a Secchi disk prior to the sampling event. Transparency was found to be 1.2 feet at the time of the survey. Based on the survey protocol, plants were sampled to a depth of 15 feet. However, plants were only present to a maximum depth of 10 feet. Sixty sites were randomly selected within the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Table 12.

Eurasian watermilfoil dominated the plant community throughout the littoral zone and within each stratum. Eurasian watermilfoil was identified at 37% of sites surveyed throughout Witmer Lake. It was also the most frequently identified plant species in the 0-5 foot stratum. Overall, Eurasian watermilfoil dominated the plant community and was present at four times the dominance of other plants throughout the littoral zone and at three times the dominance in the 0-5 foot stratum. Furthermore, Eurasian watermilfoil was the only aquatic plant identified within the 5-10 foot stratum. This species was found at 60% of points surveyed in this stratum. Northern watermilfoil was relatively abundant overall and in the 0-5 foot stratum. All other plant species were present in low abundance.

Locations where exotic species, including Eurasian watermilfoil and curly-leaf pondweed were identified are displayed in Figures 7 and 8. Within Witmer Lake, Eurasian watermilfoil was located at a number of sites; however, it was generally present in relatively low density during the Tier II survey. There was not a particular pattern to the distribution of Eurasian watermilfoil throughout the lake. Curly-leaf pondweed was not identified within Witmer Lake during the Tier II survey.

**Table 12. Witmer Lake, summer Tier II survey metrics and data, August 10, 2006.**

County:	Lagrange	Sites with plants:	28	Mean species/site:	0.60
Date:	4-Aug-06	Sites with native plants:	12	Mean native species/site:	0.23
Secchi (ft):	1.2	Number of species:	7	Species diversity:	0.58
Max. plant depth (ft):	10	Number of native species:	6	Native species diversity:	0.68
Trophic status:	hypereutrophic	Maximum species/site:	3	Rake diversity:	0.48
Total number of sites:	60			Native rake diversity:	0.63
<b>All Depths (0-15 feet)</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Site Frequency</b>	<b>Relative Density</b>	<b>Mean Density</b>	<b>Dominance</b>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	36.7	0.60	1.64	12.00
Northern watermilfoil	<i>Myriophyllum exalbescentis</i>	11.7	0.15	1.13	3.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	5.0	0.05	1.00	1.00
Coontail	<i>Ceratophyllum demersum</i>	1.7	0.02	1.00	0.33
Illinois pondweed	<i>Potamogeton illinoensis</i>	1.7	0.02	1.00	0.33
Southern naiad	<i>Najas guadalupensis</i>	1.7	0.02	1.00	0.33
Sago pondweed	<i>Stuckenia pectinatus</i>	1.7	0.02	1.00	0.33
Filamentous algae		26.7			
<b>Depth: 0-5 feet</b>					
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	32.0	0.52	1.63	10.40
Northern watermilfoil	<i>Myriophyllum exalbescentis</i>	14.0	0.18	1.29	3.60
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	6.0	0.06	1.00	1.20
Coontail	<i>Ceratophyllum demersum</i>	2.0	0.02	1.00	0.40
Illinois pondweed	<i>Potamogeton illinoensis</i>	2.0	0.02	1.00	0.40
Sago pondweed	<i>Stuckenia pectinatus</i>	2.0	0.02	1.00	0.40
Southern naiad	<i>Najas guadalupensis</i>	2.0	0.02	1.00	0.40
Filamentous algae		30.0		1.13	
<b>Depth: 5-10 feet</b>					
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	60.0	1.00	1.67	20.00
Filamentous algae		10.0			



## **Westler Lake**

The Tier II survey on Westler Lake was conducted on August 4, 2006. Transparency was measured using a Secchi disk prior to the sampling event. Transparency was found to be two feet at the time the survey was conducted. Based on the survey protocol, plants were sampled to a depth of 15 feet. Plants were present throughout the entire sampled water column. Forty sites were randomly selected within the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Table 13.

Eurasian watermilfoil was the most frequent plant species present in Westler Lake. Eurasian watermilfoil was identified at 30% of sites sampled throughout the lake and at 53% of sites in the 0-5 foot stratum. Eurasian watermilfoil was also more dominant (6.0) than other species present in the lake compared with other species (<2.5). Seven other species were identified during the Tier II survey; however, these species were present in relatively low density and frequency. Eurasian watermilfoil also dominated the plant community within the 0-5 and 5-10 foot strata.

Locations where exotic species, including Eurasian watermilfoil and curly-leaf pondweed were identified are displayed in Figures 7 and 8. Overall, Eurasian watermilfoil was identified at 12 sites throughout Westler Lake. Sites where Eurasian watermilfoil was identified are limited to the lakes eastern end and along the southern shoreline near the lake's western end. Like many of the other lakes in the chain, Eurasian watermilfoil within Westler Lake was found in relatively low abundance during the Tier II survey.

**Table 13. Westler Lake, summer Tier II survey metrics and data, August 4, 2006.**

County:	Lagrange	Sites with plants:	17	Mean species/site:	0.63
Date:	4-Aug-06	Sites with native plants:	8	Mean native species/site:	0.28
Secchi (ft):	2	Number of species:	8	Species diversity:	0.72
Max. plant depth (ft):	15	Number of native species:	7	Native species diversity:	0.84
Trophic status:	eutrophic	Maximum species/site:	4	Rake diversity:	0.74
Total number of sites:	40			Native rake diversity:	0.8
<b>All Depths (0-15 feet)</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Site Frequency</b>	<b>Relative Density</b>	<b>Mean Density</b>	<b>Dominance</b>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	30.0	0.30	1.00	6.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	7.5	0.13	1.67	2.50
Coontail	<i>Ceratophyllum demersum</i>	5.0	0.05	1.00	1.00
Chara	<i>Chara spp.</i>	5.0	0.05	1.00	1.00
Northern watermilfoil	<i>Myriophyllum exalbescent</i>	5.0	0.05	1.00	1.00
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	5.0	0.05	1.00	1.00
Southern naiad	<i>Najas guadalupensis</i>	2.5	0.03	1.00	0.50
Sago pondweed	<i>Stuckenia pectinatus</i>	2.5	0.03	1.00	0.50
Filamentous algae	<i>Algae</i>	60.0			
<b>Depth: 0-5 feet</b>					
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	52.9	0.53	1.00	10.59
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	11.8	0.12	1.00	2.35
Coontail	<i>Ceratophyllum demersum</i>	5.9	0.06	1.00	1.18
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	5.9	0.06	1.00	1.18
Filamentous algae	<i>Algae</i>	88.2			
<b>Depth: 5-10 feet</b>					
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	15.4	0.15	1.00	3.08
Chara	<i>Chara spp.</i>	7.7	0.08	1.00	1.54
Northern watermilfoil	<i>Myriophyllum exalbescent</i>	7.7	0.08	1.00	1.54
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	7.7	0.08	1.00	1.54
Sago pondweed	<i>Stuckenia pectinatus</i>	7.7	0.08	1.00	1.54
Filamentous algae	<i>Algae</i>	46.2			

Common Name	Scientific Name	Site Frequency	Relative Density	Mean Density	Dominance
<b><u>Depth: 10-15 feet</u></b>					
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	10.0	0.30	3.00	6.00
Coontail	<i>Ceratophyllum demersum</i>	10.0	0.10	1.00	2.00
Chara	<i>Chara spp.</i>	10.0	0.10	1.00	2.00
Northern watermilfoil	<i>Myriophyllum exalbescens</i>	10.0	0.10	1.00	2.00
Southern naiad	<i>Najas guadalupensis</i>	10.0	0.10	1.00	2.00
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	10.0	0.10	1.00	2.00
Filamentous algae	<i>Algae</i>	30.0		1.00	

## Dallas Lake

The Tier II survey on Dallas Lake was conducted August 4, 2006. Transparency was measured using a Secchi disk prior to the sampling. Transparency was moderately poor (3 feet) at the time of the assessment. This could be due to the increased water depth or elevated sediment and nutrient loading which resulted from the >12" rain which fell in the watershed in the week preceding the survey. Based on the survey protocol, plants were sampled to a depth of 20 feet. Plants were present throughout the entire water column. Sixty sites were randomly selected throughout the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Table 14.

Eurasian watermilfoil was the most dominant plant species in Dallas Lake with a site frequency of 35% and the greatest relative and mean densities of any plant species identified in the lake. Variable-leaf pondweed and spiny naiad were also present in high abundance throughout the lake. In the 0-5 foot stratum, Eurasian watermilfoil was the most dominant plant and possessed the greatest relative (0.83) and mean (2.14) densities of any plant species within this stratum. This is nearly 8 times the relative density and more than double the mean density of other plants found in Dallas Lake during the Tier II survey. Furthermore, Eurasian watermilfoil was identified at nearly 40% of the sampling points within the 0-5 foot stratum. All other species were found at less than 12% of sampling points within this stratum. Spiny naiad was also abundant in the 0-5 foot strata and dominated the plant community within the 5-10 foot strata. In the 5-10 foot stratum, spiny naiad was identified at 26% surveyed sites and had relative and mean densities of 0.37 and 1.4, respectively. Southern naiad, variable-leaf pondweed, and Eurasian watermilfoil were also relatively abundant in the 5-10 foot stratum. All three species were identified at 16% of the sample sites and possessed a dominance of 3.2. Eurasian watermilfoil dominated the plant community within the 10-15 foot stratum being found at 50% of the sites sampled. Eurasian watermilfoil also possessed the greatest relative density (0.88). Spiny naiad and variable-leaf pondweed were also relatively abundant in this stratum; spiny naiad possessed the greatest mean density of any species present in the 10-15 foot stratum. Northern watermilfoil and variable-leaf pondweed were co-dominant in the 15-20 foot stratum. Both plants had a site frequency of 20, a relative density of 0.20, and a mean density of 1 (Table 14). None of the species found at this depth were observed in high density and plant growth was overall relatively sparse.

Locations where exotic species, including Eurasian watermilfoil and curly-leaf pondweed were identified are displayed in Figures 7 and 8. Dallas Lake possessed the highest number of locations where Eurasian watermilfoil was identified during the Tier II survey. Additionally, Dallas Lake was the only lake within the Five Lakes Chain where Eurasian watermilfoil was present in a density which scored as 5 during the Tier II survey. In general, Eurasian watermilfoil is scattered around the lake's shoreline and is not limited to any particular location within the lake. Curly-leaf pondweed was not identified within Dallas Lake during the Tier II survey.

**Table 14. Dallas Lake, summer Tier II survey metrics and data, August 4, 2006.**

County:	Lagrange	Sites with plants:	39	Mean species/site:	1.10
Date:	4-Aug-06	Sites with native plants:	28	Mean native species/site:	0.75
Secchi (ft):	3	Number of species:	14	Species diversity:	0.83
Max. plant depth (ft):	20	Number of native species:	12	Native species diversity:	0.84
Trophic status:	eutrophic	Maximum species/site:	4	Rake diversity:	0.75
Total number of sites:	60			Native rake diversity:	0.83
<b>All Depths (0-20 feet)</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Site Frequency</b>	<b>Relative Density</b>	<b>Mean Density</b>	<b>Dominance</b>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	35.0	0.65	1.86	13.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	21.7	0.22	1.00	4.33
Spiny naiad	<i>Najas marina</i>	15.0	0.22	1.44	4.33
Illinois pondweed	<i>Potamogeton illinoensis</i>	8.3	0.08	1.00	1.67
Southern naiad	<i>Najas guadalupensis</i>	6.7	0.07	1.00	1.33
Northern watermilfoil	<i>Myriophyllum exalbescens</i>	5.0	0.05	1.00	1.00
Sago pondweed	<i>Stuckenia pectinatus</i>	5.0	0.05	1.00	1.00
Coontail	<i>Ceratophyllum demersum</i>	3.3	0.03	1.00	0.67
Two-leaf water milfoil	<i>Myriophyllum heterophyllum</i>	3.3	0.03	1.00	0.67
Chara	<i>Chara spp.</i>	1.7	0.02	1.00	0.33
Water star grass	<i>Heteranthera dubia</i>	1.7	0.02	1.00	0.33
Robbin's pondweed	<i>Potamogeton robbinsii</i>	1.7	0.02	1.00	0.33
Humped bladderwort	<i>Utricularia gibba</i>	1.7	0.02	1.00	0.33
Filamentous algae	<i>Algae</i>	63.3			
<b>Depth: 0-5 feet</b>					
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	38.9	0.83	2.14	16.70
Spiny naiad	<i>Najas marina</i>	11.1	0.11	1.00	2.20
Illinois pondweed	<i>Potamogeton illinoensis</i>	11.1	0.11	1.00	2.20
Southern naiad	<i>Najas guadalupensis</i>	5.6	0.06	1.00	1.11
Pondweed hybrid	<i>Potamogeton hybrid</i>	5.6	0.06	1.00	1.11
Water star grass	<i>Heteranthera dubia</i>	5.6	0.06	1.00	1.11
Two-leaf water milfoil	<i>Myriophyllum heterophyllum</i>	5.6	0.06	1.00	1.11



<b>Depth: 0-5 feet (cont.)</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Site Frequency</b>	<b>Relative Density</b>	<b>Mean Density</b>	<b>Dominance</b>
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	38.9	0.39	1.00	7.78
Filamentous algae	<i>Algae</i>	83.3			
<b>Depth: 5-10 feet</b>					
Spiny naiad	<i>Najas marina</i>	26.3	0.37	1.40	7.37
Southern naiad	<i>Najas guadalupensis</i>	15.8	0.16	1.00	3.16
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	15.8	0.16	1.00	3.16
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	15.8	0.16	1.00	3.16
Two-leaf water milfoil	<i>Myriophyllum heterophyllum</i>	10.5	0.11	1.00	2.11
Illinois pondweed	<i>Potamogeton illinoensis</i>	10.5	0.11	1.00	2.11
Coontail	<i>Ceratophyllum demersum</i>	5.3	0.05	1.00	1.05
Water star grass	<i>Heteranthera dubia</i>	5.3	0.05	1.00	1.05
Robbin's pondweed	<i>Potamogeton robbinsii</i>	5.3	0.05	1.00	1.05
Sago pondweed	<i>Stuckenia pectinatus</i>	5.3	0.05	1.00	1.05
Filamentous algae	<i>Algae</i>	57.9			
<b>Depth: 10-15 feet</b>					
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	50.0	0.88	1.75	17.50
Spiny naiad	<i>Najas marina</i>	12.5	0.25	2.00	5.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	12.5	0.13	1.00	2.50
Illinois pondweed	<i>Potamogeton illinoensis</i>	12.5	0.13	1.00	2.50
Sago pondweed	<i>Stuckenia pectinatus</i>	6.3	0.06	1.00	1.25
Northern watermilfoil	<i>Myriophyllum exalbescens</i>	6.3	0.06	1.00	1.25
Coontail	<i>Ceratophyllum demersum</i>	6.3	0.06	1.00	1.25
Chara	<i>Chara spp.</i>	6.3	0.06	1.00	1.25
Filamentous algae	<i>Algae</i>	43.8			

Common Name	Scientific Name	Site Frequency	Relative Density	Mean Density	Dominance
<b>Depth: 15-20 feet</b>					
Northern watermilfoil	<i>Myriophyllum exalbescens</i>	20.0	0.20	1.00	4.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	20.0	0.20	1.00	4.00
Southern naiad	<i>Najas guadalupensis</i>	10.0	0.10	1.00	2.00
Spiny naiad	<i>Najas marina</i>	10.0	0.10	1.00	2.00
Sago pondweed	<i>Stuckenia pectinatus</i>	10.0	0.10	1.00	2.00
Humped bladderwort	<i>Utricularia gibba</i>	10.0	0.10	1.00	2.00
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	10.0	0.10	1.00	2.00
Filamentous algae	<i>Algae</i>	70.0			

## **Hackenburg Lake**

The Tier II survey on Hackenburg Lake was conducted August 10, 2006. Transparency was measured using a Secchi disk prior to completing the survey. Transparency was found to be 3.25 feet. Based on the survey protocol, plants were sampled to a depth of 15 feet. Plants were in fact present throughout the entire water column. Thirty sites were randomly selected within the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Table 15.

Coontail dominated the plant community throughout Hackenburg Lake. This species was found at the highest percentage of sampling sites (60%) and also had the highest relative and mean density overall (Table 15). Coontail was dominant in all of the surveyed strata (0-5ft, 5-10ft, and 10-15ft) with the strength of dominance increasing with depth (Table 15). In the 0-5 foot stratum, Eurasian watermilfoil, chara, and variable-leaf pondweed were also relatively abundant. Each of these species were identified at 30% or more of the sites surveyed in the 0-5 foot stratum. Illinois pondweed was relatively abundant in the 5-10 foot stratum, occurring at 30% of surveyed sites. In the 10-15 foot stratum, coontail was the most dominant species.

Locations where exotic species, including Eurasian watermilfoil and curly-leaf pondweed were identified are displayed in Figures 7 and 8. Eurasian watermilfoil was located in low density at five locations scattered around the perimeter of Hackenburg Lake. There is not apparent pattern to the distribution of Eurasian watermilfoil within Hackenburg Lake. Hackenburg Lake also contained the only location where curly-leaf pondweed was observed within the Five Lakes during the Tier II survey (Figure 8). Again, curly-leaf pondweed and Eurasian watermilfoil were present in relatively low density.

**Table 15. Hackenburg Lake, summer Tier II survey metrics and data, August 10, 2006.**

County:	Lagrange	Sites with plants:	23	Mean species/site:	1.50
Date:	11-Aug-06	Sites with native plants:	23	Mean native species/site:	1.30
Secchi (ft):	3.25	Number of species:	12	Species diversity:	0.79
Max. plant depth (ft):	15	Number of native species:	10	Native species diversity:	0.74
Trophic status:	eutrophic	Maximum species/site:	4	Rake diversity:	0.74
Total number of sites:	30			Native rake diversity:	0.69
<b>All Depths (0-15 feet)</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Site Frequency</b>	<b>Relative Density</b>	<b>Mean Density</b>	<b>Dominance</b>
Coontail	<i>Ceratophyllum demersum</i>	60.0	0.87	1.44	17.33
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	16.7	0.17	1.00	3.33
Illinois pondweed	<i>Potamogeton illinoensis</i>	16.7	0.17	1.00	3.33
Chara	<i>Chara spp.</i>	13.3	0.13	1.00	2.67
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	13.3	0.13	1.00	2.67
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	3.3	0.10	3.00	2.00
Northern watermilfoil	<i>Myriophyllum exalbescent</i>	6.7	0.07	1.00	1.33
Common bladderwort	<i>Utricularia vulgaris</i>	6.7	0.07	1.00	1.33
Southern naiad	<i>Najas guadalupensis</i>	3.3	0.03	1.00	0.67
Curly-leaf pondweed	<i>Potamogeton crispus</i>	3.3	0.03	1.00	0.67
Pondweed hybrid	<i>Potamogeton species</i>	3.3	0.03	1.00	0.67
Sago pondweed	<i>Stuckenia pectinatus</i>	3.3	0.03	1.00	0.67
Filamentous algae	<i>Algae</i>	93.3			
<b>Depth: 0-5 feet</b>					
Coontail	<i>Ceratophyllum demersum</i>	50.0	0.50	1.00	10.00
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	40.0	0.40	1.00	8.00
Chara	<i>Chara spp.</i>	30.0	0.30	1.00	6.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	30.0	0.30	1.00	6.00
Southern naiad	<i>Najas guadalupensis</i>	10.0	0.10	1.00	2.00
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	10.0	0.30	3.00	6.00
Illinois pondweed	<i>Potamogeton illinoensis</i>	10.0	0.10	1.00	2.00



Common Name	Scientific Name	Site Frequency	Relative Density	Mean Density	Dominance
<b><u>Depth: 0-5 feet (cont.)</u></b>					
Sago pondweed	<i>Stuckenia pectinatus</i>	10.0	0.10	1.00	2.00
Common bladderwort	<i>Utricularia vulgaris</i>	10.0	0.10	1.00	2.00
Curly-leaf pondweed	<i>Potamogeton crispus</i>	10.0	0.10	1.00	2.00
Filamentous algae	<i>Algae</i>	100.0			
<b><u>Depth: 5-10 feet</u></b>					
Coontail	<i>Ceratophyllum demersum</i>	60.0	0.80	1.33	16.00
Illinois pondweed	<i>Potamogeton illinoensis</i>	30.0	0.30	1.00	6.00
Chara	<i>Chara spp.</i>	10.0	0.10	1.00	2.00
Northern watermilfoil	<i>Myriophyllum exalbescent</i>	10.0	0.10	1.00	2.00
Pondweed hybrid	<i>Potamogeton species</i>	10.0	0.10	1.00	2.00
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	10.0	0.10	1.00	2.00
Filamentous algae	<i>Algae</i>	90.0			
<b><u>Depth: 10-15 feet</u></b>					
Coontail	<i>Ceratophyllum demersum</i>	70.0	1.30	1.86	26.00
Northern watermilfoil	<i>Myriophyllum exalbescent</i>	10.0	0.10	1.00	2.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	10.0	0.10	1.00	2.00
Common bladderwort	<i>Utricularia vulgaris</i>	10.0	0.10	1.00	2.00
Filamentous algae	<i>Algae</i>	90.0			

### **Messick Lake**

The Tier II survey on Messick Lake was conducted on August 10, 2006. Transparency was measured using a Secchi disk prior to sampling event. Transparency was found to be 3 feet during the survey. Based on the survey protocol, plants were sampled to a depth of 15 feet. Plants were present in all of the sampled strata to a depth of 15 feet. Forty sites were randomly selected within the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Table 16.

Coontail dominated the plant community throughout the water column. Coontail was found at approximately 33% of sampled sites and possessed the greatest relative and mean densities (0.83 and 2.54, respectively) of any plants identified within Messick Lake. All other plants possessed relative densities less than 0.33 and mean densities less than 1.2. Coontail dominated the plant community in the 5-10 and 10-15 foot strata. Coontail was found at a lower percentage of sites in the 10-15 foot stratum as compared with its frequency in the 5-10 foot stratum; however, coontail was found in greater dominance in the deeper stratum. Despite the predominance of coontail in the 0-5 foot stratum, spiny naiad was more prevalent being found at 35% of sampled sites. Dominance of spiny naiad, Eurasian watermilfoil, and coontail were similar in this stratum (Table 16). Eurasian watermilfoil was the second most abundant plant species throughout the littoral zone. Eurasian watermilfoil was also the second most dominant species present in each of the strata surveyed.

Locations where exotic species, including Eurasian watermilfoil and curly-leaf pondweed were identified are displayed in Figures 7 and 8. Like the other lakes in the chain, Eurasian watermilfoil was scattered around the shoreline of Messick Lake. Eurasian watermilfoil was identified at 11 sites throughout the lake. At all sites where Eurasian watermilfoil was identified, it was present in relatively low density. Eurasian watermilfoil was found at only one site within a density of 3 or greater.

**Table 16. Messick Lake, summer Tier II survey metrics and data, August 10, 2006.**

County:	Lagrange	Sites with plants:	29	Mean species/site:	1.18
Date:	10-Aug-06	Sites with native plants:	23	Mean native species/site:	0.90
Secchi (ft):	3	Number of species:	9	Species diversity:	0.67
Max. plant depth (ft):	10	Number of native species:	8	Native species diversity:	0.71
Trophic status:	eutrophic	Maximum species/site:	5	Rake diversity:	0.58
Total number of sites:	40			Native rake diversity:	0.54
<b><u>All Depths (0-15 feet)</u></b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Site Frequency</b>	<b>Relative Density</b>	<b>Mean Density</b>	<b>Dominance</b>
Coontail	<i>Ceratophyllum demersum</i>	32.5	0.83	2.54	16.50
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	27.5	0.33	1.18	6.50
Spiny naiad	<i>Najas marina</i>	17.5	0.23	1.29	4.50
Illinois pondweed	<i>Potamogeton illinoensis</i>	10.0	0.15	1.50	3.00
Chara	<i>Chara spp.</i>	7.5	0.08	1.00	1.50
Southern naiad	<i>Najas guadalupensis</i>	7.5	0.08	1.00	1.50
Northern watermilfoil	<i>Myriophyllum exalbescens</i>	5.0	0.05	1.00	1.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	5.0	0.05	1.00	1.00
Sago pondweed	<i>Stuckenia pectinatus</i>	5.0	0.05	1.00	1.00
Filamentous algae	<i>Algae</i>	87.5		1.00	
<b><u>Depth: 0-5 feet</u></b>					
Spiny naiad	<i>Najas marina</i>	35.3	0.47	1.33	9.41
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	29.4	0.41	1.40	8.24
Coontail	<i>Ceratophyllum demersum</i>	17.6	0.41	2.33	8.24
Chara	<i>Chara spp.</i>	17.6	0.18	1.00	3.53
Illinois pondweed	<i>Potamogeton illinoensis</i>	17.6	0.18	1.00	3.53
Southern naiad	<i>Najas guadalupensis</i>	11.8	0.12	1.00	2.35
Northern watermilfoil	<i>Myriophyllum exalbescens</i>	5.9	0.06	1.00	1.18
Sago pondweed	<i>Stuckenia pectinatus</i>	5.9	0.06	1.00	1.18
Filamentous algae	<i>Algae</i>	94.1		1.00	

Common Name	Scientific Name	Site Frequency	Relative Density	Mean Density	Dominance
<b><u>Depth: 5-10 feet</u></b>					
Coontail	<i>Ceratophyllum demersum</i>	46.2	1.08	1.00	21.54
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	30.8	0.31	1.00	6.15
Northern watermilfoil	<i>Myriophyllum exalbescent</i>	7.7	0.08	2.33	1.54
Southern naiad	<i>Najas guadalupensis</i>	7.7	0.08	1.00	1.54
Spiny naiad	<i>Najas marina</i>	7.7	0.08	1.00	1.54
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	7.7	0.08	1.00	1.54
Illinois pondweed	<i>Potamogeton illinoensis</i>	7.7	0.23	1.00	4.62
Sago pondweed	<i>Stuckenia pectinatus</i>	7.7	0.08	3.00	1.54
Filamentous algae	<i>Algae</i>	100.0			
<b><u>Depth: 10-15 feet</u></b>					
Coontail	<i>Ceratophyllum demersum</i>	40.0	1.20	3.00	24.00
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	20.0	0.20	1.00	4.00
Variable-leaf pondweed	<i>Potamogeton gramineus</i>	10.0	0.10	1.00	2.00
Filamentous algae	<i>Algae</i>	60.0			



Dallas, Hackenburg, and Messick Lakes possessed greater numbers of species and native species than the lakes surveyed by Pearson (2004; Table 17). Witmer Lake possessed less total species and less native species than the average determined by Pearson (2004), while Westler Lake possessed diversities equal to Pearson's observations. In addition, all Five Lakes had greater native species diversity per site surveyed and greater native rake diversity as compared to the lakes surveyed by Pearson (2004). Westler, Dallas, and Hackenburg Lakes possessed greater species diversity and greater rake diversity than the lakes surveyed by Pearson. However, all Five Lakes exhibited lower species richness (average number of species per site) and native species richness (average number of native species per site) than the lakes surveyed by Pearson (Table 17). It should be noted that Pearson's study was not intended, nor designed, to create baseline native aquatic plant data for evaluative purposes, and therefore over-reliance on comparisons to Pearson's data in making management decisions should be avoided.

**Table 17. A comparison of the aquatic plant communities in the Five Lakes to the average values for plant community metrics found by Pearson (2004) in his survey of 21 northern Indiana lakes. Bolding indicates that the value exceeds Pearson average.**

<b>Metric</b>	<b>Dallas Lake</b>	<b>Hackenburg Lake</b>	<b>Messick Lake</b>	<b>Witmer Lake</b>	<b>Westler Lake</b>	<b>Indiana Average</b>
Number of species collected	<b>14</b>	<b>12</b>	<b>9</b>	7	<b>8</b>	<b>8</b>
Number of native species	<b>12</b>	<b>10</b>	<b>8</b>	6	<b>7</b>	<b>7</b>
Rake Diversity (SDI)	<b>0.75</b>	<b>0.74</b>	0.58	0.48	<b>0.74</b>	<b>0.62</b>
Native Rake Diversity (SDI)	<b>0.83</b>	<b>0.69</b>	<b>0.54</b>	<b>0.63</b>	<b>0.8</b>	<b>0.5</b>
Species Richness (avg)	1.1	1.5	1.18	0.6	0.63	<b>1.61</b>
Native Species Richness	0.75	1.3	0.9	0.23	0.28	<b>1.33</b>
Site Species Diversity	<b>0.83</b>	<b>0.79</b>	0.67	0.58	<b>0.72</b>	<b>0.66</b>
Site Species native diversity	<b>0.84</b>	<b>0.74</b>	<b>0.71</b>	<b>0.68</b>	<b>0.84</b>	<b>0.56</b>

### Aquatic Vegetation Sampling Discussion

The primary focus of an aquatic vegetation management plan is to document changes within the aquatic plant community due to treatment and seasonal variation and to develop plans for future work. Previous assessments completed in the Five Lakes Chain indicated less diversity coupled with higher plant densities than those observed during the 2006 assessment. Eurasian watermilfoil dominated the plant communities present in Witmer, Westler, and Dallas lakes during the 2005 DNR assessment (DNR data files, 2005). In total, Eurasian watermilfoil accounted for 17-30%, 24-30%, and 20-40% of the plant communities present within Witmer, Westler, and Dallas lakes, respectively during the 2005 May and August Tier II assessments. In total, four species were identified with Witmer and Westler lakes in 2005, while the DNR identified seven and eight species, respectively, during the May and August sampling events. The dominance of Eurasian watermilfoil continues within these three lakes during the 2006 assessment; however, this species accounts for only 13% of Witmer Lake's plant community, 12% of Westler Lake's plant community, and 6% of Dallas Lake's plant community. During the current assessment, a minimum of seven species were identified in each of the lakes with Dallas Lake containing the highest diversity with 14 submergent species present during the Tier II survey.

Coontail dominated the plant communities present in Hackenburg and Messick lakes during the 2005 DNR assessments. This plant accounted for 46-67% of Hackenburg Lake's plant community and 20-25% of Messick Lake's plant community during the 2005 assessments. Coontail was again

the most dominant species during the 2006 Tier II assessment; however, it was present within 16-17% of the community within these two lakes during the 2006 assessment. A partial explanation for this drop in density could be due to the presence of other species within the plant communities during the most recent assessment. During the 2005 assessments, the DNR identified only three to four species within Hackenburg Lake and three to nine species within Messick Lake. During the most recent assessment, JFNew identified nine submergent species in Messick Lake and 12 submergent species in Hackenburg Lake.

As no LARE-funded herbicide application occurred during the previous calendar year, no statements to the impact of treatment can be made at this time.

### **8.3 Macrophyte Inventory Discussion**

Since we cannot account for all the spatial variables impacting upon the plant community such as boat-traffic and changes in nutrient availability or for temporal variables such as climactic conditions, an exact and accurate analysis regarding changes in the aquatic plant community present within the Five Lakes is difficult to complete. Still, general trends emerge from the data that are useful for the purpose of management decisions. When comparing Eurasian watermilfoil site frequency for the 2005 and 2006 surveys, it appears that Eurasian watermilfoil site frequency declined in Witmer, Westler, and Dallas lakes so that 2006 site frequencies are less than those calculated in 2005. However, Eurasian watermilfoil densities are greater in Messick and Hackenburg lakes during the 2006 assessment than those observed during the 2005 August assessment completed by the DNR.

Review of the site frequency and relative densities of curly-leaf pondweed in Five Lakes reveals major differences in the composition of the plant community with respect to this species. However, the differences associated with densities and frequencies of this particular species are likely due to the species growth pattern rather than its presence or absence in the plant community. Based on this idea, the specifics of density and frequency changes that occurred with respect to curly-leaf pondweed are not discussed in further detail.

### **9.0 Aquatic Vegetation Management Alternatives**

No new aquatic vegetation management alternatives are available for discussion that have not been covered by previous plans. Consult the original aquatic plant management plan completed by Weed Patrol in 2004 for more information on management alternatives.

### **10.0 Public Involvement**

The LARE biologist, district fisheries biologists, and a representative from an herbicide applicator met October 25, 2006 to discuss the 2006 aquatic plant treatment and identify aquatic plant treatment options for 2007. From this meeting, it was determined that aquatic plant growth within the Five Lakes is limited by a number of factors including: amount of available and colonizable substrate, water clarity, water quality, and residence times. In total, nearly 30 acres of dense Eurasian watermilfoil growth were identified during the initial Tier I survey. However, aquatic plant density declined when water clarity declined resulting in sparse plant growth. All meeting attendees agreed that Eurasian watermilfoil growth in the Five Lakes is relatively stable and that treatment of all areas in which Eurasian watermilfoil grows is not the best use of LARE monies or lake association energies at this time. Based on this discussion, an application for the treatment of a total of 10 acres of Eurasian watermilfoil will be filed with the LARE program for next year, if the Five Lakes

Conservation Association wishes to continue in the program. The suggested treatment areas are detailed in the Management Action Strategy Section below.

The public meeting for the aquatic plant management plan occurred in concert with a presentation about progress on the watershed management plan and future plans and projects within the Five Lakes watershed. The meeting occurred on September 23, 2006. During this larger meeting, the LARE program in general and the aquatic plant management program specifically were discussed. Attendees were polled for their thoughts on previous aquatic plant management treatments within the Five Lakes, their thoughts on the lakes' water quality and plant communities, and their use of the lakes. Additionally, results of the initial aquatic plant survey were presented and the outline of future activities associated with aquatic plant treatment within the Five Lakes was laid out.

Results from the survey are as follows:

- All attendees have lived at the Five Lakes for 10 years or longer.
- The majority of respondents utilize the lakes (Witmer, Westler, and Dallas) for swimming, boating, and fishing. No one uses the lakes for irrigation or drinking water purposes.
- Most attendees do not feel that aquatic plants are at nuisance levels within the lakes; however, these same individuals typically participate in aquatic plant treatment and feel that aquatic plants interfere with their enjoyment of the lakes and decrease their property values.
- A majority of individuals feel that there are too many boats and jet skis on the lakes, that water quality is poor, and that dredging is needed within the lakes.

### **11.0 Public Education**

Future public education efforts associated with the Five Lakes Aquatic Plant Management Plan follow efforts identified during completion of the Five Lakes Watershed Management Plan. These items are not repeated herein. Rather individuals should refer to the FLWMP for more information (JFNew and DJCase, 2006). There is however, an additional species of concern that was identified in Lake Manitou (Fulton County) in 2006. This species is hydrilla, which is an extremely aggressive submerged aquatic plant species that looks similar to common elodea. The basic difference is the number of leaves: hydrilla contains five leaves while common elodea only contains three leaves. Appendix D contains more detailed information non hydrilla, its habitat, and its distribution. Efforts to education individuals on the control, spread, and issues associated with this and other exotic species should follow the Stop the Hitchhikers! Campaign which can be found at [www.protectyourwaters.net](http://www.protectyourwaters.net). At a minimum, the FLCA should post warnings and send information to all members of the FLCA about this plant.

### **12.0 Integrated Management Action Strategy**

Post-treatment surveys suggest that Eurasian watermilfoil is still a concern in several areas throughout the Five Lakes. However, treatment of all of these areas is not warranted at this time. Rather, treatment of areas of Eurasian watermilfoil identified in locations of heavy usage or high traffic (Figure 9) is recommended for 2007. This includes approximately 10 acres of Eurasian watermilfoil treatment. Permit applications for aquatic plant treatment within the Five Lakes are included in Appendix E. Eurasian watermilfoil should be treated with 2,4-D or renovate at a rate determined during the 2007 pre-treatment assessment (Tony Cunningham, Weed Patrol, personal communication). Because of the relatively short residence times which occur within these lakes, granular rather liquid herbicide should be used in order to generate adequate coverage and targeted treatment rates. Treatment with 2,4-D is less expensive ranging from \$350-400 per acre and takes

less time to be effective (approximately 3 weeks). Using renovate is more costly (\$470/acre) and takes approximately 5 weeks to be fully effective. Total cost for treatment is anticipated to be approximately \$3,500 to \$4,700.

### **13.0 Project Budget**

Costs for aquatic plant assessment and treatment in 2007 are as follows:

- Eurasian watermilfoil treatment of approximately 10 acres at a cost of \$350-470 per acre for a maximum total cost of \$5,000.
- Standard LARE assessment, public meeting, and plan update costs are based on 2006 LARE requirements (two Tier I surveys; one Tier II survey; public meeting; plan update). Assessment costs are estimated to total \$12,450, while the plan update is anticipated to occur as a cost of \$5000.

Total fees for 2007 aquatic plant assessment, herbicide application, and plan updated are estimated at \$22,450.

The following time schedule is anticipated for aquatic plant management activities for the Five Lakes in 2007:

May 15-June 15, 2007	Tier I assessment (*must occur prior to LARE-funded treatment)
May 15-June 15, 2007	LARE-funded aquatic plant treatment
July 15-August 30, 2007	Tier I and Tier II post-treatment assessment
August-September, 2007	Public meeting
November 2007	Meeting between IDNR LARE and fisheries staff, FLCA, and contractor
December 15, 2007	Plan update and permit and LARE application for 2008 funding due

### **14.0 Monitoring and Plan Update Procedures**

Monitoring shall follow procedures determined by the LARE program. Likewise, plan updates will conform to LARE requirements. Additional monitoring and treatment may occur outside of the LARE program. This could include, but is not limited to: assessment and treatment of channel areas to limit Eurasian watermilfoil regrowth and privately-funded aquatic plant assessments. As these items are not part of the LARE program, their inclusion in any future LARE aquatic plant management plan updates is not required; however, their inclusion is suggested as a mechanism to contain all pertinent aquatic plant management information in one location and deal with changes in community and treatment requirements at one time even if all actions are not funded through the LARE program.



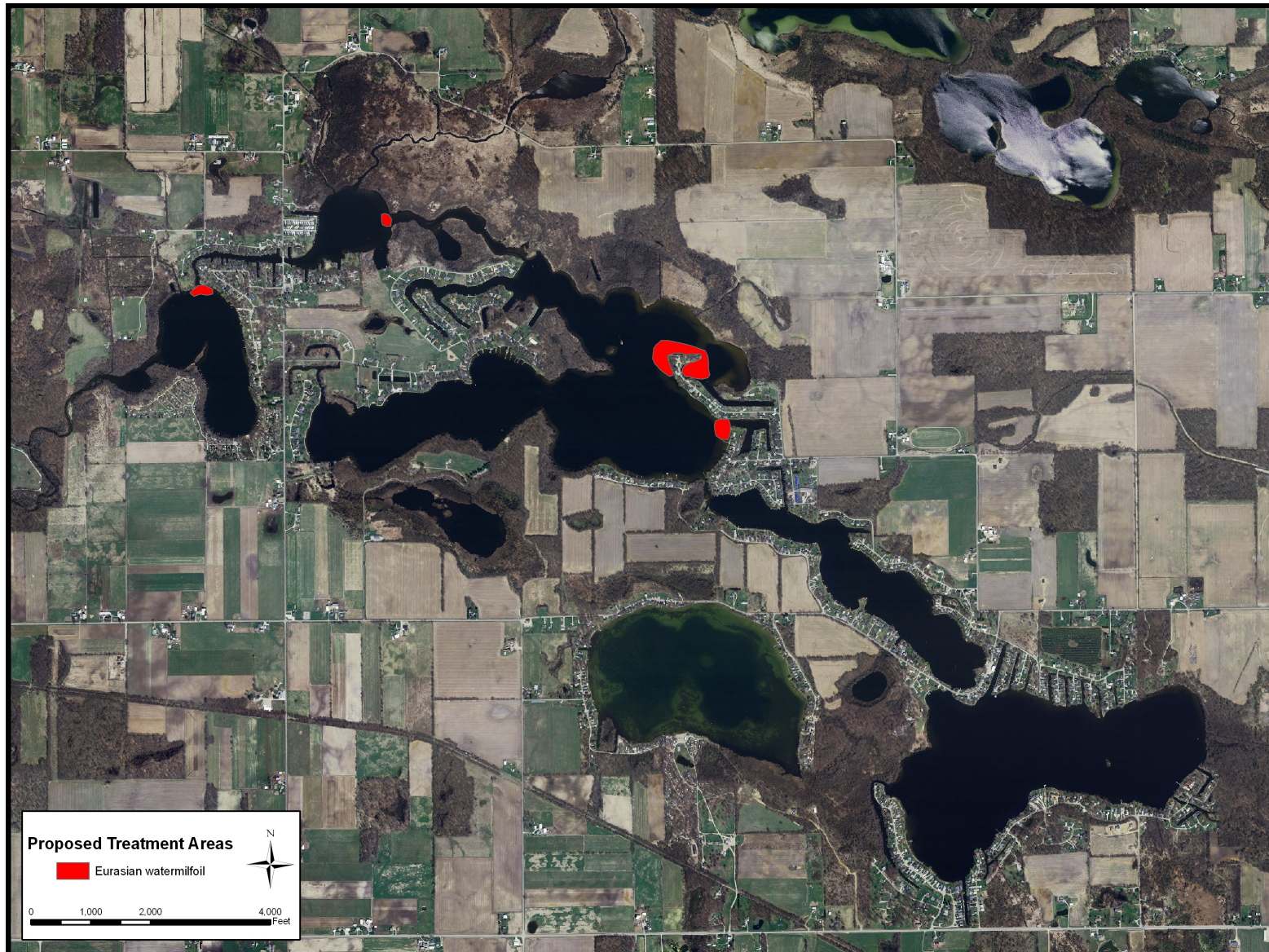


Figure 9. Recommended 2007 treatment areas within the Five Lakes.

### **15.0 References Cited**

Weed Patrol, Inc. 2005 Version 2. Indian Chain of Lakes Aquatic Plant Management Plan 2005-2008. Indiana Department of Natural Resources, Division of Fish and Wildlife, Indianapolis, Indiana.

Indiana Department of Natural Resources. 2006a. Tier I aquatic vegetation survey protocol. Indianapolis, Indiana.

Indiana Department of Natural Resources. 2006b. Tier II aquatic vegetation survey protocol. Indianapolis, Indiana.

Pearson, J. 2004. A sampling method to assess occurrence, abundance and distribution of submersed aquatic plants in Indiana lakes. Indiana Department of Natural Resources, Division of Fish and Wildlife, Indianapolis, Indiana.

**APPENDIX A:**  
**JUNE TIER I SURVEY DATASHEETS**  
**FIVE LAKES**  
**AQUATIC PLANT MANAGEMENT PLAN UPDATE**

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Witmer

Lake ID:

County:

Lagrange

Date:

6/5/06

Habitat Stratum:

IL

Ave. Lake

35

Lake Level:

normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

3.5

Total # of Plant

2

Beds Surveyed:

Total # of

Species:

30

Littoral Zone Size (acres):

39

Littoral Zone Max. Depth (ft):

10.5



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:



# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 3

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/5/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 01	Waterbody Name: Witmer Lake	Center of the Bed	
Bed Size: 38 ac			
Substrate: 3, 6	Waterbody ID:	Latitude: 634177 Northing	
Marl?	Total # of Species 24	Longitude: 4599110 Easting	
High Organic?	<b>Canopy Abundance at Site</b>		Max. Lakeward Extent of Bed
	S:4	N:1	F:2
			E:2
			Latitude: NA
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	1			
COROBL	1			
FILALG	1			
IRIVIR	1			
LEMMIN	1			
LYTSAL	1			
MYRSPI	4			
NUPADV	2			
NUPVAR	1			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
PONCOR	1			
POTAMP	1			
POTCRI	1			
POTFOL	1		1	
POTILL	1		1	
POTPEC	1			
SCIACU	1			
SCIPUN	1			
SPIPOL	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

## Page 2 of 3

**ORGANIZATION:** JFNew

**DATE: 6/5/06**

## SITE COORDINATES

Waterbody Name: Witmer Lake

### Center of the Bed

Latitude: 634177 Northing

Waterbody ID:

Longitude: 4599110 Easting

Total # of Species 24

Max. Lakeward Extent of Bed

### CanopyAbundance at Site

Latitude: NA

N:1
-----

F:2
-----

E:2

Longitude: NA

### Individual Plant Bed Survey

**Comments:**

## Substrate:

Marl

1 = Present

**0** = absent

### High Organic

## High Organ

1 = Present

**0** = absent

1 = < 2%

3 = 21-60%

4 = > 60%

**0** = as defined

2 = Genus suspected

**3 = Unknown**

Unique number or

location of a species:

referenced on attached map

**Abundance:**

**Voucher:**

1 = Taken, not varified

2 = Taken, varifieert

2 – Taken, varied

**F** = Floating, rooted

**S** = Submersed

## Page 3 of 3

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/5/06
SITE INFORMATION					SITE COORDINATES
Plant Bed ID: 02	Waterbody Name: Witmer Lake				Center of the Bed
Bed Size: 4 ac					Latitude: 634485 Northing
Substrate: 6	Waterbody ID:				Longitude: 4599260 Easting
Marl?	Total # of Species 12				Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site				Latitude: NA
	S:4	N:1	F:1	E:1	Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

Substrate:

**1 = Silt/Clay**

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

## High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species susceptible

**2 = Genus suspected**

**3 = Unknown**

**Voucher:**

**0** = Not Taken

1 = Taken, not varified

**2** = Taken, verified

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Westler

Lake ID:

County:

Lagrange

Date:

6/5/06

Habitat Stratum:

IL

Ave. Lake

20.1

Lake Level:

normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

4.0

Total # of Plant

1

Beds Surveyed:

Total # of

Species:

22

Littoral Zone Size (acres):

16.6

Littoral Zone Max. Depth (ft):

12.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:



# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 1

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/5/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 01	Waterbody Name: Westler Lake	Center of the Bed	
Bed Size: 17 ac		Latitude: 633114 Northing	
Substrate: 3	Waterbody ID:	Longitude: 4600030 Easting	
Marl?	Total # of Species 22	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:4	N:1	F:3 E:2
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	2			
COROBL	1			
FILALG	1			
IRIVIR	1			
LEMMIN	1			
MYRSPI	3			
NUPADV	1			
NUPVAR	2			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
PONCOR	1			
POTAMP	2			
POTCRI	1			
POTGRA	1			
POTILL	1			
POTPEC	1			
SCIACU	1			
SPIPOL	1			
TYPLAT	1			
ZANPAL	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 1

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 8/26/03
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>
Plant Bed ID: Channel	Waterbody Name: Dallas - Hackenberg Channel	Center of the Bed
Bed Size:		Latitude: NA
Substrate:	Waterbody ID:	Longitude: NA
Marl?	Total # of Species 21	Max. Lakeward Extent of Bed
High Organic?	<b>Canopy Abundance at Site</b>	Latitude: NA
	S:3 N:1 F:3 E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	2			
CHARA	2			
DECOVER	1			
FILALG	1			
LEMMIN	1			
MYRSPI	3			
NUPADV	3			
NUPVAR	1			
NYMTUB	2			
PELVIR	2			
PHAARU	1			
POTAMP	2			
POTCRI	1			
POTILL	1			
POTPEC	1			
SCIACU	1			
SPIPOL	1			
TYPANG	1			
TYPLAT	1			
ZANPAL	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Dallas

Lake ID:

County:

Lagrange

Date:

6/7/06

Habitat Stratum:

IL

Ave. Lake

32.3

Lake Level:

Normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

4.0

Total # of Plant

12

Beds Surveyed:

Total # of

Species:

35

Littoral Zone Size (acres):

67

Littoral Zone Max. Depth (ft):

12.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

## Page 1 of 14

# State of Indiana Department of Natural Resources

ORGANIZATION: JFNew					DATE: 6/7/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 01	Waterbody Name: Dallas				Center of the Bed	
Bed Size: 5.4 ac						
Substrate:	Waterbody ID:				Latitude: 632057 Northing	
Marl?	Total # of Species 8				Longitude: 4600660 Easting	
High Organic?	CanopyAbundance at Site				Max. Lakeward Extent of Bed	
	S:2	N:1	F:1	E:1	Latitude: NA	
					Longitude: NA	

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

**Comments:**

## REMINDER INFORMATION

Substrate:

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

**4 = Hard Clay**

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

## High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

**1 = < 2%**

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species susceptible

**2 = Genus suspected**

**3 = Unknown**

**Voucher:**

**0** = Not Taken

1 = Taken, not varified

**2 = Taken, varifieer**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map



## Page 2 of 14

**State of Indiana Department of Natural Resources**

[illegible]

## Page 3 of 14

**State of Indiana Department of Natural Resources**

[illegible]

# Aquatic Vegetation Plant Bed Data Sheet

Page 4 of 14

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/7/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 04	Waterbody Name: Dallas	Center of the Bed	
Bed Size: 5 ac		Latitude: 630869 Northing	
Substrate:	Waterbody ID:	Longitude: 4600750 Easting	
Marl?	Total # of Species 24	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:4	N:1	F:2 E:2
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CERDEM	1			
CHARA	2			
COROBL	1			
FILALG	2			
HETDUB	1		1	
MYRHET	1			
MYRSPI	3			
NUPADV	2			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
PHRAUS	1			
PONCOR	1			
POT hybrid	1		1	
POTAMP	1			
POTCRI	3			
POTGRA	2			
POTILL	1			
POTPEC	2			
POTROB	1			
POTZOS	1			
SCIACU	2			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

## Page 5 of 14

# State of Indiana Department of Natural Resources

ORGANIZATION: JFNew					DATE: 6/7/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 04	Waterbody Name: Dallas				Center of the Bed	
Bed Size:						
Substrate:	Waterbody ID:				Latitude: 630869 Northing	
Marl?	Total # of Species 24				Longitude: 4600750 Easting	
High Organic?	CanopyAbundance at Site				Max. Lakeward Extent of Bed	
	S:4	N:1	F:2	E:2	Latitude: NA	
					Longitude: NA	

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

**Comments:**

## REMINDER INFORMATION

<b>Substrate:</b>	<b>Marl</b>	<b>Canopy:</b>	<b>QE Code:</b>	<b>Reference ID:</b>
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspect	letter to denote specific
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;
4 = Hard Clay	<b>High Organic</b>	4 = > 60%	3 = Unknown	referenced on attached map
5 = Gravel/Rock	1 = Present			
6 = Sand	0 = absent			
	<b>Overall Surface Cover</b>	<b>Abundance:</b>	<b>Voucher:</b>	
	N = Nonrooted floating	1 = < 2%	0 = Not Taken	
	F = Floating, rooted	2 = 2-20%	1 = Taken, not varified	
	E = Emergent	3 = 21-60%	2 = Taken, varified	
	S = Submersed	4 = > 60%		

## Page 6 of 14

# State of Indiana Department of Natural Resources

[illegible]



## Page 7 of 14

**State of Indiana Department of Natural Resources**

[illegible]

# Aquatic Vegetation Plant Bed Data Sheet

Page 8 of 14

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/7/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 07	Waterbody Name: Dallas	Center of the Bed	
Bed Size: 12.2 ac		Latitude: 631248 Northing	
Substrate:	Waterbody ID:	Longitude: 4601260 Easting	
Marl?	Total # of Species 18	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:2	N:1	F:1 E:1
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CERDEM	1			
EQU sp.	1			
IRIVIR	1			
MYRSPI	3			
NUPADV	2			
NYMTUB	1			
PELVIR	1			
PHAARU	1			
POTAMP	1			
POTCRI	2			
POTGRA	2			
POTILL	1			
POTPEC	2			
SCIACU	1			
SCIAME	1			
TYPANG	1			
TYPLAT	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

# Aquatic Vegetation Plant Bed Data Sheet

Page 9 of 14

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew				DATE: 6/7/06	
<b>SITE INFORMATION</b>				<b>SITE COORDINATES</b>	
Plant Bed ID: 08	Waterbody Name: Dallas			Center of the Bed	
Bed Size: 9.6 ac					
Substrate:	Waterbody ID:			Latitude: 631430 Northing	
Marl?	Total # of Species 21			Longitude: 4601610 Easting	
High Organic?	CanopyAbundance at Site			Max. Lakeward Extent of Bed	
	S:3	N:1	F:2	E:1	Latitude: NA
					Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
COROBL	1			
DECOVER	1			
FILALG	2			
IRIVIR	1			
MYRHET	1			
MYRSPI	3			
NUPADV	2			
NYMTUB	1			
PELVIR	1			
PHAARU	1			
PHRAUS	1			
POT hybrid	2		1	
POTAMP	1			
POTCRI	1			
POTGRA	2			
POTILL	1			
POTPEC	1			
SCIACU	1			
TYPANG	1			
ZANPAL	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	



## Page 11 of 14

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/7/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 10		Waterbody Name: Dallas			Center of the Bed	
Bed Size: 1.8 ac						
Substrate:		Waterbody ID:			Latitude: 632125 Northing	
Marl?		Total # of Species 7			Longitude: 4601510 Easting	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:2	N:1	F:2	E:1	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

Substrate:

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifie**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map



# Aquatic Vegetation Plant Bed Data Sheet

Page 12 of 14

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/7/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 11	Waterbody Name: Dallas	Center of the Bed	
Bed Size: 12.6 ac			
Substrate:	Waterbody ID:	Latitude: 632604 Northing	
Marl?	Total # of Species 23	Longitude: 4601200 Easting	
High Organic?	<b>Canopy Abundance at Site</b>		Max. Lakeward Extent of Bed
	S:4	N:1	F:2
			E:1
			Latitude: NA
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
CERDEM	1			
CHARA	3			
COROBL	1			
DECVER	1			
FILALG	2			
HETDUB	1		1	
LEMMIN	1			
MYRHET	1			
MYRSPI	3			
NAJGUA	1		1	
NUPADV	2			
NYMTUB	2			
PHAARU	1			
POTBER	1		1	
POTCRI	2			
POTGRA	2			
POTILL	2			
POTPEC	2			
SCIACU	1			
TYPANG	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

## Page 13 of 14

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/7/06
SITE INFORMATION					SITE COORDINATES
Plant Bed ID: 11	Waterbody Name: Dallas				Center of the Bed
Bed Size:					Latitude: 632604 Northing
Substrate:	Waterbody ID:				Longitude: 4601200 Easting
Marl?	Total # of Species 23				Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site				Latitude: NA
	S:4	N:1	F:2	E:1	Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

## Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifié**

## Page 14 of 14

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/7/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 12		Waterbody Name: Dallas			Center of the Bed	
Bed Size: 14.4 ac						
Substrate:		Waterbody ID:			Latitude: 632356 Northing	
Marl?		Total # of Species 8			Longitude: 4601030 Easting	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:2	N:1	F:2	E:1	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

Substrate:

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifie**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Hackenburg

Lake ID:

County:

Lagrange

Date:

6/5/06

Habitat Stratum:

IL

Ave. Lake

12.3

Lake Level:

normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

6.0

Total # of Plant

1

Total # of

29

Beds Surveyed:

Species:

Littoral Zone Size (acres):

17.0

Littoral Zone Max. Depth (ft):

18.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/5/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 01	Waterbody Name: Hackenberg	Center of the Bed	
Bed Size: 17 ac		Latitude: 630537 Northing	
Substrate: 2, 3	Waterbody ID:	Longitude: 4601800 Easting	
Marl?	Total # of Species 29	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:4	N:1	F:3 E:2
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	3			
CHARA	1			
COROBL	1			
DECOVER	1			
FILALG	4			
IRIVIR	1			
LEMMIN	1			
MYRHET	1		1	
MYRSPI	3			
NUPADV	3			
NUPVAR	1			
NYMTUB	2			
PELVIR	2			
PHAARU	1			
PONCOR	1			
POTAMP	2			
POTBER	1		1	
POTCRI	3			
POTILL	2			
POTNOD	1			
POTPEC	2			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	



## Page 2 of 2

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/5/06
SITE INFORMATION					SITE COORDINATES
Plant Bed ID: 01	Waterbody Name: Hackenberg				Center of the Bed
Bed Size:					Latitude: 630537 Northing
Substrate: 2, 3	Waterbody ID:				Longitude: 4601800 Easting
Marl?	Total # of Species 29				Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site				Latitude: NA
	S:4	N:1	F:3	E:2	Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

3 = Sand w/Silt

4 = Hard Clay

5 = Gravel/Rock

6 = Sand

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

3 = 21-60%

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

3 = 21-60%

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

3 = Unknown

## Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2** = Taken, varifie

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/5/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 01	Waterbody Name: Messick - Hackenberg	Center of the Bed	
Bed Size:		Latitude: NA	
Substrate:	Waterbody ID:	Longitude: NA	
Marl?	Total # of Species 25	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:2	N:1	F:3 E:2
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	2			
CHARA	1			
COROBL	1			
DECOVER	1			
FILALG	3			
HETDUB	1			
IRIVIR	1			
LEMMIN	1			
MYRSPI	2			
NUPADV	3			
NYMTUB	2			
PELVIR	2			
PHAARU	1			
PONCOR	1			
POTAMP	1			
POTBER	1		1	
POTCRI	2			
POTILL	2			
POTPEC	1			
SCIACU	1			
SCIFLU	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

## Page 2 of 2

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/5/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 01		Waterbody Name: Messick - Hackenberg			Center of the Bed	
Bed Size:						
Substrate:		Waterbody ID:			Latitude: NA	
Marl?		Total # of Species 25			Longitude: NA	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:2	N:1	F:3	E:2	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifie**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Messick

Lake ID:

County:

Lagrange

Date:

6/7/06

Habitat Stratum:

IL

Ave. Lake

21.3

Lake Level:

normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

7.5

Total # of Plant

1

Total # of

31

Beds Surveyed:

Species:

Littoral Zone Size (acres):

21.5

Littoral Zone Max. Depth (ft):

22.5



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 6/5/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 01	Waterbody Name: Messick	Center of the Bed	
Bed Size: 22 ac		Latitude: 629753 Northing	
Substrate: 1, 2	Waterbody ID:	Longitude: 4601180 Easting	
Marl?	Total # of Species 31	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:4	N:1	F:3 E:2
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	3			
CHARA	1			
COROBL	1			
CXSTRI	1			
DECVER	1			
ELONUT	1		1	
FILALG	1			
IRIVIR	1			
LYTSAL	1			
MYRSPI	3			
NAJFLE	1		1	
NAJGUA	1			
NUPADV	2			
NUPVAR	1			
NYMTUB	2			
PELVIR	2			
PHAARU	1			
PONCOR	1			
POTAMP	2			
POTBER	1		1	
POTCRI	2			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

## Page 2 of 2

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 6/5/06
SITE INFORMATION					SITE COORDINATES
Plant Bed ID: 01	Waterbody Name: Messick				Center of the Bed
Bed Size:					Latitude: 629753 Northing
Substrate: 1, 2	Waterbody ID:				Longitude: 4601180 Easting
Marl?	Total # of Species 31				Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site				Latitude: NA
	S:4	N:1	F:3	E:2	Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifie**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map



**APPENDIX B:**  
**AUGUST TIER I SURVEY DATASHEETS**  
**FIVE LAKES**  
**AQUATIC PLANT MANAGEMENT PLAN UPDATE**

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Witmer

Lake ID:

County:

Lagrange

Date:

8/10/06

Habitat Stratum:

IL

Ave. Lake

35

Depth (ft):

Lake Level:

high

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

1.2

Total # of Plant

2

Beds Surveyed:

Total # of

Species:

35

Littoral Zone Size (acres):

39

Littoral Zone Max. Depth (ft):

3.6



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

Water level elevated approximately 8 inches due to large precipitation event.

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 3

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/10/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 01	Waterbody Name: Witmer Lake			Center of the Bed	
Bed Size:				Latitude: 634177 Northing	
Substrate:	Waterbody ID:			Longitude: 4599110 Easting	
Marl?	Total # of Species 30			Max. Lakeward Extent of Bed	
High Organic?	Canopy Abundance at Site			Latitude: NA	
	S:2	N:2	F:2	E:1	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
CERDEM	2			
CHARA	1			
COROBL	1			
DECVER	1			
FILALG	2			
ILEVER	1			
IRIVIR	1			
LEEORY	1			
LEMMIN	1			
LEMTRI	1			
LYTSAL	1			
MYREXA	1			
MYRHET	1			
MYRSPI	2			
NUPADV	1			
NUPVAR	2			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
POTAMP	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

## Page 2 of 3

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 8/10/06
SITE INFORMATION					SITE COORDINATES
Plant Bed ID: 01	Waterbody Name: Witmer Lake				Center of the Bed
Bed Size:					Latitude: 634177 Northing
Substrate:	Waterbody ID:				Longitude: 4599110 Easting
Marl?	Total # of Species 30				Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site				Latitude: NA
	S:2	N:2	F:2	E:1	Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

3 = Sand w/Silt

4 = Hard Clay

4 = Hard Clay  
5 = Gravel/Rock

6 = Sand

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

0 = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

E = Emergent

**E** = Emergent  
**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

3 = 21-60%

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

3 = 21-60%

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

3 = Unknown

## Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2** = Taken, varified

# Aquatic Vegetation Plant Bed Data Sheet

Page 3 of 3

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/10/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 02	Waterbody Name: Witmer Lake			Center of the Bed	
Bed Size:				Latitude: 634485 Northing	
Substrate:	Waterbody ID:			Longitude: 4599260 Easting	
Marl?	Total # of Species 13			Max. Lakeward Extent of Bed	
High Organic?	Canopy Abundance at Site			Latitude: NA	
	S:1	N:1	F:1	E:1	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
ASCINC	1			
CEPOCC	1			
CERDEM	1			
COROBL	1			
CXSTRI	1			
FILALG	1			
LYTSAL	1			
MYRSPI	1			
PELVIR	1			
POLAMS	1			
POLCOC	1			
ROSPAL	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Westler

Lake ID:

County:

Lagrange

Date:

8/10/06

Habitat Stratum:

IL

Ave. Lake

20.1

Lake Level:

high

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

4.0

Total # of Plant

1

Beds Surveyed:

Total # of

Species:

29

Littoral Zone Size (acres):

16.6

Littoral Zone Max. Depth (ft):

12.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

Water level elevated by approximately 10 inches at the time of the survey due to large precipitation event.



Aquatic Vegetation Plant Bed Data Sheet

State of Indiana Department of Natural Resources

Page 1 of 2

ORGANIZATION: JFNew

DATE: 8/9/06

SITE INFORMATION

Plant Bed ID: 01

Waterbody Name: Westler Lake

Bed Size:

Latitude: 633114 Northing

Substrate: 3, 5

Waterbody ID:

Longitude: 4600030 Easting

Marl?

Total # of Species 29

Max. Lakeward Extent of Bed

High Organic?

CanopyAbundance at Site

Latitude: NA

S:2

N:1

F:2

E:2

Longitude: NA

SITE COORDINATES

Center of the Bed

SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
ASCINC	1			
CEPOCC	1			
CERDEM	2			
COROBL	1			
FILALG	2			
LEMMIN	1			
LIPLAN	1			
LYSNUM	1			
LYTSAL	1			
MYRSPI	2			
NAJGUA	1			
NUPADV	2			
NUPVAR	1			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
POLCOC	1			
POLLAP	1			
PONCOR	1			
POTAMP	1			
POTGRA	2			

Individual Plant Bed Survey

Comments:

REMINDER INFORMATION

Substrate:

1 = Silt/Clay

2 = Silt w/Sand

3 = Sand w/Silt

4 = Hard Clay

5 = Gravel/Rock

6 = Sand

Marl

1 = Present

0 = absent

High Organic

1 = Present

0 = absent

Overall Surface Cover

N = Nonrooted floating

F = Floating, rooted

E = Emergent

S = Submersed

Canopy:

1 = < 2%

2 = 2-20%

3 = 21-60%

4 = > 60%

Abundance:

1 = < 2%

2 = 2-20%

3 = 21-60%

4 = > 60%

QE Code:

0 = as defined

1 = Species suspected

2 = Genus suspected

3 = Unknown

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

Voucher:

0 = Not Taken

1 = Taken, not verified

2 = Taken, verified



# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Dallas

Lake ID:

County:

Lagrange

Date:

8/10/06

Habitat Stratum:

IL

Ave. Lake

32.3

Lake Level:

Above

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

3.0

Total # of Plant

12

Total # of

41

Beds Surveyed:

Species:

Littoral Zone Size (acres):

67

Littoral Zone Max. Depth (ft):

9.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

Water depth 12 inches higher than normal due to rain events in the previous 48 hours.

## Page 1 of 16

# State of Indiana Department of Natural Resources

ORGANIZATION: JFNew					DATE: 8/9/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 01	Waterbody Name: Dallas				Center of the Bed	
Bed Size:						
Substrate: 5, 6	Waterbody ID:				Latitude: 632057 Northing	
Marl?	Total # of Species 11				Longitude: 4600660 Easting	
High Organic?	CanopyAbundance at Site				Max. Lakeward Extent of Bed	
	S:1	N:1	F:1	E:1	Latitude: NA	
					Longitude: NA	

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

**Comments:**

## REMINDER INFORMATION

Substrate:

**1 = Silt/Clay**

**2 = Silt w/Sand**

**3 = Sand w/Silt**

**4 = Hard Clay**

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

## High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

**1 = < 2%**

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

**1 = < 2%**

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

**2 = Genus suspected**

**3 = Unknown**

**Voucher:**

**0** = Not Taken

1 = Taken, not varified

**2 = Taken, varified**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map



## Page 3 of 16

**State of Indiana Department of Natural Resources**

[illegible]



# Aquatic Vegetation Plant Bed Data Sheet

Page 4 of 16

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 04	Waterbody Name: Dallas			Center of the Bed	
Bed Size:				Latitude: 630869 Northing	
Substrate: 3	Waterbody ID:			Longitude: 4600750 Easting	
Marl?	Total # of Species 23			Max. Lakeward Extent of Bed	
High Organic?	Canopy Abundance at Site			Latitude: NA	
	S:3	N:1	F:2	E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
CERDEM	1			
CHARA	1			
COROBL	1			
FILALG	1			
HETDUB	2			
MYRSPI	2			
NAJGUA	1			
NUPADV	1			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
PHRAUS	1			
PLAOCC	1			
PONCOR	1			
POT *hybrid	1			
POTAMP	1			
POTILL	2			
POTPEC	1			
POTROB	1			
SCIACU	2			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

## Page 5 of 16

# State of Indiana Department of Natural Resources

[illegible]

## Page 6 of 16

**State of Indiana Department of Natural Resources**

[illegible]

## Page 7 of 16

# State of Indiana Department of Natural Resources

[illegible]

# Aquatic Vegetation Plant Bed Data Sheet

Page 8 of 16

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 07	Waterbody Name: Dallas			Center of the Bed	
Bed Size:				Latitude: 631248 Northing	
Substrate:	Waterbody ID:			Longitude: 4601260 Easting	
Marl?	Total # of Species 24			Max. Lakeward Extent of Bed	
High Organic?	Canopy Abundance at Site			Latitude: NA	
	S:3	N:1	F:1	E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
ASCINC	1			
CEPOCC	1			
CERDEM	1			
COROBL	1			
FILALG	2			
IRIVIR	1			
LYTSAL	1			
MYRHET	1			
MYRSPI	3			
NUPADV	1			
NYMTUB	1			
PELVIR	2			
PHAARU	1			
PLAOCC	1			
PONCOR	1			
POTGRA	1			
POTILL	2			
POTNOD	1			
POTPEC	1			
SCIACU	1			
SCIPUN	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	



# Aquatic Vegetation Plant Bed Data Sheet

Page 10 of 16

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 08	Waterbody Name: Dallas			Center of the Bed	
Bed Size:				Latitude: 631430 Northing	
Substrate: 3	Waterbody ID:			Longitude: 4601610 Easting	
Marl?	Total # of Species 27			Max. Lakeward Extent of Bed	
High Organic?	Canopy Abundance at Site			Latitude: NA	
	S:3	N:1	F:2	E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CALCAN	1			
CEPOCC	1			
CERDEM	2			
COROBL	1			
DECVER	1			
FILALG	3			
FRAPES	1			
HETDUB	2			
IRIVIR	1			
MYRHET	1			
MYRSPI	2			
NAJGUA	1			
NAJMAR	1			
NUPADV	2			
NYMTUB	2			
PELVIR	2			
PHAARU	1			
PHRAUS	1			
POLCOC	1			
POT *hybrid	2			
POTGRA	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	



## Page 11 of 16

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 8/9/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 08		Waterbody Name: Dallas			Center of the Bed	
Bed Size:						
Substrate: 3		Waterbody ID:			Latitude: 631430 Northing	
Marl?		Total # of Species 27			Longitude: 4601610 Easting	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:3	N:1	F:2	E:2	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

## Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifie**

# Aquatic Vegetation Plant Bed Data Sheet

Page 12 of 16

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 09	Waterbody Name: Dallas			Center of the Bed	
Bed Size:				Latitude: 632056 Northing	
Substrate: 3, 4	Waterbody ID:			Longitude: 4601550 Easting	
Marl?	Total # of Species 13			Max. Lakeward Extent of Bed	
High Organic?	Canopy Abundance at Site			Latitude: NA	
	S:1	N:1	F:1	E:1	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
COROBL	1			
FILALG	1			
NAJMAR	1			
NYMTUB	1			
PHAARU	1			
POTGRA	1			
POTILL	1			
POTPEC	1			
SCIACU	1			
TYPANG	1			
TYPLAT	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

## Page 13 of 16

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 8/9/06
SITE INFORMATION					SITE COORDINATES
Plant Bed ID: 10	Waterbody Name: Dallas				Center of the Bed
Bed Size:					Latitude: 632125 Northing
Substrate: 3	Waterbody ID:				Longitude: 4601510 Easting
Marl?	Total # of Species 11				Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site				Latitude: NA
	S:2	N:1	F:2	E:1	Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifié**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet

Page 14 of 16

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 8/9/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 11	Waterbody Name: Dallas	Center of the Bed	
Bed Size:			
Substrate: 1	Waterbody ID:	Latitude: 632604 Northing	
Marl?	Total # of Species 25	Longitude: 4601200 Easting	
High Organic?	<b>Canopy Abundance at Site</b>		Max. Lakeward Extent of Bed
	S:4	N:1	F:3
			E:2
			Latitude: NA
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
CERDEM	2			
CHARA	1			
COROBL	1			
DECVER	1			
FILALG	3			
LEMMIN	1			
MYRHET	1			
MYRSPI	3			
NAJMAR	2			
NUPADV	2			
NYMTUB	2			
PELVIR	1			
PHAARU	1			
POLCOC	1			
POTBER	1			
POTGRA	1			
POTILL	2			
POTNOD	1			
POTPEC	2			
SCIACU	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	

## Page 15 of 16

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 8/9/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 11		Waterbody Name: Dallas			Center of the Bed	
Bed Size:						
Substrate: 1		Waterbody ID:			Latitude: 632604 Northing	
Marl?		Total # of Species 25			Longitude: 4601200 Easting	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:4	N:1	F:3	E:2	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

Substrate:

**1 = Silt/Clay**

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suscep

**2 = Genus suspected**

**3 = Unknown**

**Voucher:**

**0** = Not Taken

**1** = Taken, not varified

**2 = Taken, verified**

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet

Page 16 of 16

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 12	Waterbody Name: Dallas			Center of the Bed	
Bed Size:					
Substrate: 3	Waterbody ID:			Latitude: 632356 Northing	
Marl?	Total # of Species 18			Longitude: 4601030 Easting	
High Organic?	Canopy Abundance at Site			Max. Lakeward Extent of Bed	
	S:2	N:1	F:1	E:1	Latitude: NA
					Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CERDEM	1			
FILALG	3			
LEMMIN	1			
LYTSAL	1			
MYRHET	1			
MYRSPI	2			
NAJGUA	1			
NUPADV	1			
NYMTUB	1			
PELVIR	1			
POTAMP	1			
POTGRA	2			
POTILL	2			
POTPEC	2			
SCIACU	1			
SCIPUN	1			
TYPANG	1			
VALAME	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

Aquatic Vegetation Plant Bed Data Sheet

State of Indiana Department of Natural Resources

Page 1 of 2

ORGANIZATION: JFNew

DATE: 8/9/06

SITE INFORMATION

Plant Bed ID: Channel

Waterbody Name: Dallas - Hackenberg Channel

Bed Size:

Substrate:

Waterbody ID:

Marl?

Total # of Species 25

High Organic?

CanopyAbundance at Site

S:3

N:1

F:3

E:2

SITE COORDINATES

Center of the Bed

Latitude: NA

Longitude: NA

Max. Lakeward Extent of Bed

Latitude: NA

Longitude: NA

SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ASCINC	1			
CEPOCC	1			
CERDEM	2			
CHARA	1			
DECOVER	1			
FILALG	2			
HETDUB	1			
MYRHET	1			
MYRSPI	3			
NAJMAR	1			
NUPADV	2			
NUPVAR	2			
NYMTUB	2			
PELVIR	1			
PHAARU	1			
PHRAUS	1			
POLCOC	1			
PONCOR	1			
POT *hybrid	1			
POTAMP	1			
POTILL	3			
POTPEC	2			

Individual Plant Bed Survey

Comments:

REMINDER INFORMATION

Substrate:

1 = Silt/Clay

2 = Silt w/Sand

3 = Sand w/Silt

4 = Hard Clay

5 = Gravel/Rock

6 = Sand

Marl

1 = Present

0 = absent

High Organic

1 = Present

0 = absent

Overall Surface Cover

N = Nonrooted floating

F = Floating, rooted

E = Emergent

S = Submersed

Canopy:

1 = < 2%

2 = 2-20%

3 = 21-60%

4 = > 60%

Abundance:

1 = < 2%

2 = 2-20%

3 = 21-60%

4 = > 60%

QE Code:

0 = as defined

1 = Species suspected

2 = Genus suspected

3 = Unknown

Voucher:

0 = Not Taken

1 = Taken, not verified

2 = Taken, verified

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map



## Page 2 of 2

**ORGANIZATION:** JFNew

DATE: 8/9/06

## SITE COORDINATES

Waterbody Name: Dallas - Hackenberg Channel
---

Center of the Bed

Latitude: NA

Waterbody ID:

Longitude: NA

Total # of Species 25

Max. Lakeward Extent of Bed

### CanopyAbundance at Site

Latitude: NA

N:1
-----

N:1
-----

F:3
-----

E:2

Longitude: NA

### Individual Plant Bed Survey

**Comments:**

## Substrate:

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

1 = < 2%

3 = 21-60%

4 = > 60%

**0** = as defined

2 = Genus suspected

3 = Unknown

Unique number or letter to denote specific location of a species; referenced on attached map

**Abundance:**

**Voucher:**

**2 = 2-20%**

3 = 21-60%

4 = > 60%

**S** = Submersed

1 = Taken, not

2 = Taken, varifieer

**Z** = taken, variances

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Hackenburg

Lake ID:

County:

Lagrange

Date:

6/5/06

Habitat Stratum:

IL

Ave. Lake

12.3

Lake Level:

normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

6.0

Total # of Plant

1

Beds Surveyed:

Total # of

Species:

29

Littoral Zone Size (acres):

17.0

Littoral Zone Max. Depth (ft):

18.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION		SITE COORDINATES
Plant Bed ID: 01	Waterbody Name: Hackenberg	Center of the Bed
Bed Size:		Latitude: 630537 Northing
Substrate:	Waterbody ID:	Longitude: 4601800 Easting
Marl?	Total # of Species 42	Max. Lakeward Extent of Bed
High Organic?	Canopy Abundance at Site	Latitude: NA
	S:4 N:3 F:3 E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
CERDEM	4			
CHARA	1			
CICBUL	1			
COROBL	1			
CUS sp	1			
DECVER	1			
FILALG	3			
FRAPES	1			
LEEORY	1			
LEMMIN	3		1	
LIPLAN	1			
LYTSAL	1			
MYRHET	1			
MYRSPI	2			
NAJFLE	1		1	
NAJGUA	1			
NAJMAR	1			
NUPADV	2			
NUPVAR	1			
NYMTUB	2			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

# Aquatic Vegetation Plant Bed Data Sheet

Page 2 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/9/06

SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: 01	Waterbody Name: Hackenberg			Center of the Bed	
Bed Size:				Latitude: 630537 Northing	
Substrate:	Waterbody ID:			Longitude: 4601800 Easting	
Marl?	Total # of Species 42			Max. Lakeward Extent of Bed	
High Organic?	CanopyAbundance at Site			Latitude: NA	
	S:4	N:3	F:3	E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
PELVIR	2			
PHAARU	1			
POLHYS	1			
PONCOR	1			
POT *hybrid	1			
POTAMP	2			
POTBER	1			
POTCRI	1			
POTGRA	2			
POTILL	2			
POTPEC	2			
POTPUS	1			
SAGLAT	1			
SCIACU	1			
SCIVAL	1			
SPA sp	1			
TYPANG	1			
TYPLAT	1			
UTRVUL	2			
WOLCOL	2		1	

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew DATE: 8/10/06

SITE INFORMATION		SITE COORDINATES
Plant Bed ID: 01	Waterbody Name: Messick - Hackenberg	Center of the Bed
Bed Size:		Latitude: NA
Substrate:	Waterbody ID:	Longitude: NA
Marl?	Total # of Species 25	Max. Lakeward Extent of Bed
High Organic?	CanopyAbundance at Site	Latitude: NA
	S:3 N:1 F:3 E:2	Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEPOCC	1			
CERDEM	2			
COROBL	1			
DECVER	2			
FILALG	3			
IRIVIR	1			
LEEORY	1			
LEMMIN	1			
MYRSPI	2			
NAJFLE	1			
NAJMAR	1			
NYMTUB	3			
PELVIR	2			
PHAARU	1			
POLHYS	1			
PONCOR	1			
POTBER	1			
POTILL	1			
POTPEC	1			
SCIACU	1			
SCIFLU	1			
SPAEUR	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> 1 = Silt/Clay 2 = Silt w/Sand 3 = Sand w/Silt 4 = Hard Clay 5 = Gravel/Rock 6 = Sand	<b>Marl</b> 1 = Present 0 = absent  <b>High Organic</b> 1 = Present 0 = absent	<b>Canopy:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>QE Code:</b> 0 = as defined 1 = Species suspected 2 = Genus suspected 3 = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> N = Nonrooted floating F = Floating, rooted E = Emergent S = Submersed		<b>Abundance:</b> 1 = < 2% 2 = 2-20% 3 = 21-60% 4 = > 60%	<b>Voucher:</b> 0 = Not Taken 1 = Taken, not verified 2 = Taken, verified	

## Page 2 of 2

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 8/10/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 01		Waterbody Name: Messick - Hackenberg			Center of the Bed	
Bed Size:						
Substrate:		Waterbody ID:			Latitude: NA	
Marl?		Total # of Species 25			Longitude: NA	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:3	N:1	F:3	E:2	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<p><b>REMINDER INFORMATION</b></p>	
------------------------------------	--

<b>Substrate:</b>	<b>Marl</b>
-------------------	-------------

1 = Silt/Clay

**2 = Silt w/Sand**

3 = Sand w/Silt

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species suspected

2 = Genus suspected

**3 = Unknown**

## Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

**Voucher:**

**0 = Not Taken**

1 = Taken, not varified

**2 = Taken, varifié**

# Aquatic Vegetation Reconnaissance Sampling

## Waterbody Cover Sheet

Surveying Organization:

JFNew

Waterbody Name:

Messick

Lake ID:

County:

Lagrange

Date:

8/10/06

Habitat Stratum:

IL

Ave. Lake

21.3

Lake Level:

normal

Depth (ft):

### GPS Metadata

Crew

Sara Peel

Leader:

NAD83

16N

Sub meter

Datum:

Zone:

Accuracy:

Recorder:

Scott Namestnik

Method:

Trimble PRO SRX

Secchi Depth (ft):

3.0

Total # of Plant

1

Total # of

32

Beds Surveyed:

Species:

Littoral Zone Size (acres):

21.5

Littoral Zone Max. Depth (ft):

9.0



Measured



Estimated



Measured



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

Water level normal despite large precipitation event.

# Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 2

State of Indiana Department of Natural Resources

ORGANIZATION: JFNew		DATE: 8/10/06	
<b>SITE INFORMATION</b>		<b>SITE COORDINATES</b>	
Plant Bed ID: 01	Waterbody Name: Messick	Center of the Bed	
Bed Size:		Latitude: 629753 Northing	
Substrate:	Waterbody ID:	Longitude: 4601180 Easting	
Marl?	Total # of Species 32	Max. Lakeward Extent of Bed	
High Organic?	<b>Canopy Abundance at Site</b>		Latitude: NA
	S:3	N:1	F:2 E:2
			Longitude: NA

## SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
ACESAI	1			
CEPOCC	1			
CERDEM	3			
CHARA	1			
CXSTRI	1			
DECOVER	2			
FILALG	3			
HETDUB	1			
IRIVIR	1			
LEMMIN	1			
LYTSAL	1			
MYREXA	1			
MYRSPI	2			
NAJGUA	1			
NAJMAR	2			
NUPADV	2			
NUPVAR	1			
NYMTUB	2			
PELVIR	2			
PHAARU	1			
PONCOR	1			
POT *hybrid	1			

## Individual Plant Bed Survey

Comments:

## REMINDER INFORMATION

<b>Substrate:</b> <b>1</b> = Silt/Clay <b>2</b> = Silt w/Sand <b>3</b> = Sand w/Silt <b>4</b> = Hard Clay <b>5</b> = Gravel/Rock <b>6</b> = Sand	<b>Marl</b> <b>1</b> = Present <b>0</b> = absent  <b>High Organic</b> <b>1</b> = Present <b>0</b> = absent	<b>Canopy:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>QE Code:</b> <b>0</b> = as defined <b>1</b> = Species suspected <b>2</b> = Genus suspected <b>3</b> = Unknown	<b>Reference ID:</b> Unique number or letter to denote specific location of a species; referenced on attached map
<b>Overall Surface Cover</b> <b>N</b> = Nonrooted floating <b>F</b> = Floating, rooted <b>E</b> = Emergent <b>S</b> = Submersed		<b>Abundance:</b> <b>1</b> = < 2% <b>2</b> = 2-20% <b>3</b> = 21-60% <b>4</b> = > 60%	<b>Voucher:</b> <b>0</b> = Not Taken <b>1</b> = Taken, not verified <b>2</b> = Taken, verified	



## Page 2 of 2

**State of Indiana Department of Natural Resources**

ORGANIZATION: JFNew					DATE: 8/10/06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 01		Waterbody Name: Messick			Center of the Bed	
Bed Size:						
Substrate:		Waterbody ID:			Latitude: 629753 Northing	
Marl?		Total # of Species 32			Longitude: 4601180 Easting	
High Organic?		CanopyAbundance at Site			Max. Lakeward Extent of Bed	
		S:3	N:1	F:2	E:2	Latitude: NA
						Longitude: NA

## SPECIES INFORMATION

[illegible]

### Individual Plant Bed Survey

Comments:

<b>REMINDER INFORMATION</b>	
-----------------------------	--

Substrate:

1 = Silt/Clay

**2 = Silt w/Sand**

**3 = Sand w/Silt**

4 = Hard Clay

**5 = Gravel/Rock**

**6 = Sand**

Marl

1 = Present

**0** = absent

### High Organic

1 = Present

**0** = absent

### Overall Surface Cover

**N** = Nonrooted floating

**F** = Floating, rooted

**E = Emergent**

**S** = Submersed

**Canopy:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**Abundance:**

1 = < 2%

**2 = 2-20%**

**3 = 21-60%**

4 = > 60%

**QE Code:**

**0** = as defined

1 = Species susceptible

**2 = Genus suspected**

**3 = Unknown**

**Voucher:**

**0** = Not Taken

1 = Taken, not varified

**2** = Taken, verified

Reference ID:

Unique number or letter to denote specific location of a species; referenced on attached map

**APPENDIX C:**  
**AUGUST TIER II RAW DATA**  
**FIVE LAKES**  
**AQUATIC PLANT MANAGEMENT PLAN UPDATE**

ID	LAKE	X_coord	Y_coord	SITE	DEPTH	FILALG	CERDEM	CHARA	HETDUB	MYREXA	MYRHET	NAJGUA	NAJMAR	POTAMP	POTGRA	POTHYB	POTILL	POTPUS	STUPEC	UTRGIB	UTRVUL	MYRSP1	POTCRI
1	witmer	633600	4599530	1	22																		
2	witmer	633586	4599530	2	12.5																		
3	witmer	633577	4599520	3	4													1					1
4	witmer	633594	4599400	4	20																		
5	witmer	633570	4599370	5	3		1																
6	witmer	633588	4599360	6	2																		
7	witmer	633592	4599320	7	3																	1	
8	witmer	633609	4599320	8	7																	1	
9	witmer	633594	4599280	9	4.5		1																
10	witmer	633542	4599260	10	6																		
11	witmer	633497	4599240	11	3		1									1						1	
12	witmer	633483	4599230	12	3.5											1							
13	witmer	633463	4599220	12	3.5																	1	
14	witmer	633456	4599170	14	4																		
15	witmer	633439	4599130	15	3		1																
16	witmer	633420	4599100	16	4		1															1	
17	witmer	633427	4599080	17	16.5		1																
18	witmer	633389	4599080	18	4		3																
19	witmer	633463	4599020	19	9.5																		
20	witmer	633473	4598970	20	3		1	1				1										1	
21	witmer	633486	4598950	21	8																	3	
22	witmer	633496	4598910	22																			
23	witmer	633502	4598870	23	14																		
24	witmer	633488	4598850	24	3		1																
25	witmer	633520	4598770	25	11'																		
26	witmer	633551	4598730	26	16																	1	
27	witmer	633585	4598700	26	9																		
28	witmer	633617	4598670	27	4											1							
29	witmer	633682	4598630	28	18																		
30	witmer	633717	4598630	28	7																		
31	witmer	633759	4598640	30	5		1																
32	witmer	633759	4598660	31	14																		
33	witmer	633793	4598700	32	11																	1	
34	witmer	633811	4598780	33	3.5																		
35	witmer	633796	4598780	34	10.5'																		
36	witmer	633871	4598820	35	20																		
37	witmer	633877	4598800	36	5.5																		
38	witmer	633897	4598830	37	4																		
39	witmer	633933	4598900	38	10																		
40	witmer	633978	4598920	39	2																		
41	witmer	633976	4598940	39	6.5																		

ID	LAKE	X_coord	Y_coord	SITE	DEPTH	FILALG	CERDEM	CHARA	HETDUB	MYREXA	MYRHET	NAJGUA	NAJMAR	POTAMP	POTGRA	POTHYB	POTILL	POTPUS	STUPEC	UTRGIB	UTRVUL	MYRSP1	POTCRI
42	witmer	633991	4598950	41	7																		
43	witmer	634061	4599000	42	4																		
44	witmer	634082	4599050	42						1													
45	witmer	634077	4599080	42	4.5																		3
46	witmer	634153	4599120	44	11																		3
47	witmer	634180	4599120	45	13.5																		
48	witmer	634207	4599110	46	4.5																		
49	witmer	634235	4599110	47	12																		
50	witmer	634285	4599100	48	14																		
51	witmer	634335	4599090	49	4		1																
52	witmer	634374	4599090	50	6																		
53	witmer	634379	4599100	51	27																		
54	witmer	634398	4599090	52	4																		
55	witmer	634424	4599080	53	8																		1
56	witmer	634469	4599070	55	10'																		
57	witmer	634498	4599050	55	8																		1
58	witmer	634556	4599050	56	4.5					1													
59	witmer	634560	4599070		25																		
60	witmer	634623	4599050	58	7																		3
61	witmer	634671	4599040	59	8																		
62	witmer	634720	4599030	60	7																		1
63	witmer	634754	4599020	61	5		1			1													1
64	witmer	634795	4599070	62	10.5																		
65	witmer	634832	4599110	63	3																		1
66	witmer	634856	4599180	64	15.5																		
67	witmer	634945	4599260	65																			3
68	witmer	634967	4599390		3					1									1				3
69	witmer	634952	4599430	67	4																		3
70	witmer	634953	4599470	68	3		1			3													
71	witmer	634937	4599510	68	3.5					1													
72	witmer	634922	4599540	70	3		1			1													1
73	witmer	634867	4599600	70	3																		
74	witmer	634749	4599560	71	15																		1
75	witmer	634659	4599530	72	18							1											1
76	witmer	634536	4599500	73	5																		3
77	witmer	634482	4599450	74			1																
78	witmer	634415	4599460	75	5																		1
79	witmer	634245	4599500	76	3.5		1																
80	witmer	634118	4599540	77	3.5																		
81	witmer	634049	4599580	78	3																		
82	witmer	633996	4599570	79	10		1																1
83	witmer	633928	4599550	80	6.5																		

ID	LAKE	X_coord	Y_coord	SITE	DEPTH	FILALG	CERDEM	CHARA	HETDUB	MYREXA	MYRHET	NAJGUA	NAJMAR	POTAMP	POTGRA	POTHYB	POTILL	POTPUS	STUPEC	UTRGIB	UTRVUL	MYRSP1	POTCRI
1	westler	633733	4599610	1	11.5		1															1	
2	westler	633764	4599610	2	7		1																
3	westler	633796	4599620	3	5		1															1	
4	westler	633792	4599670	4	5									1								1	
5	westler	633825	4599730	5	5.5		1															1	
6	westler	633814	4599810	6	14																		
7	westler	633732	4599850	7	8.5																		
8	westler	633713	4599910	8	13																		
9	westler	633670	4599960	9	11																	1	
10	westler	633578	4599980	10	5		1								1							1	
11	westler	633556	4600060	11	17																		
12	westler	633516	4600130	12	3		1																
13	westler	633451	4600170	14	13		1													1			
14	westler	633297	4600210	15	3.5		1																
15	westler	633132	4600350	16	20				1		1		1			3							
16	westler	633132	4600380	17	9																		
17	westler	633075	4600440	18	7		1																
18	westler	632959	4600410	19	21		1																
19	westler	632783	4600490	20	13		1																
20	westler	632643	4600570	21	20																		
21	westler	632581	4600550	22	14		1																
22	westler	632535	4600560		12		1			1													
23	westler	632455	4600530	24	4.5		1																
24	westler	632511	4600470	25	8		1							1								1	
25	westler	632601	4600420	26	17		1															1	
26	westler	632656	4600410	26	12					1													
27	westler	632687	4600410	27	13																		
28	westler	632764	4600400	28	8.5		1															1	
29	westler	632824	4600370	29	8.5																		
30	westler	632915	4600340	30	4.5		1		1													1	
31	westler	633003	4600340	31	5.5		1															1	
32	westler	633033	4600260	32	7		1															1	
33	westler	633041	4600150	33	13		1																
34	westler	633058	4600140	34	15																		
35	westler	633052	4600110	35	4		1																
36	westler	633103	4600050	36	11											1							
37	westler	633216	4600060	37	3		1																
38	westler	633262	4600010	38	11		1																
39	westler	633506	4599800	39	14																		
40	westler	633597	4599710	40	15																		

ID	LAKE	X_coord	Y_coord	SITE	DEPTH	FILALG	CERDEM	CHARA	HETDUB	MYREXA	MYRHET	NAJGUA	NAJMAR	POTAMP	POTGRA	POTHYB	POTILL	POTPUS	STUPEC	UTRGIB	UTRVUL	MYRSP1	POTCRI
1	dallas	632354	4600690	1			1																
2	dallas	632229	4600680	2	9.5																		3
3	dallas	631909	4600730	3			1									1				1			
4	dallas	631752	4600690	4	3.5		1	1						1									1
5	dallas	631642	4600790	5	2.5		1																
6	dallas	631595	4600990	6			1									1							
7	dallas	631522	4600970	7	4		1											1					
8	dallas	631339	4600820	8	24																		
9	dallas	631140	4600870	9	4		1																1
10	dallas	631079	4600860	10	3		1									1							
11	dallas	630807	4600720	11	10.5																		1
12	dallas	630599	4600750	12			1									1		1					
13	dallas	630429	4600720	13	3		1									1		1					1
14	dallas	630404	4600830	14	17.5																		
15	dallas	630503	4600990	15	8		1										1						
16	dallas	630626	4600930	16	10.5		1																3
17	dallas	630779	4600990	17			1									1		1					
18	dallas	630922	4601060	18			1																3
19	dallas	631205	4601100	19	3.5											1							
20	dallas	631269	4601260	20			1			1						1		1					
21	dallas	631525	4601180	21	4.5													1					1
22	dallas	631671	4601130	22	4		1																
23	dallas	631918	4601180	23	3		1																
24	dallas	631902	4601250	23	2.5		1																
25	dallas	631817	4601300		5		1			1				1				1					5
26	dallas	631723	4601410	25	4.5		1																
27	dallas	631648	4601520	26			1	1	1								5						
	dallas	631562	4601520	hybri																			
28	dallas	631487	4601560	27	5							1					1						3
29	dallas	631421	4601590	28																			
30	dallas	631473	4601680	29	12			1								1		1					
31	dallas	631528	4601750	30	7		1																3
32	dallas	631604	4601730	31	3		1																1
33	dallas	631619	4601700	32	2		1																
34	dallas	631724	4601630	33	3.5																		
35	dallas	631709	4601620	34	15																		

ID	LAKE	X_coord	Y_coord	SITE	DEPTH	FILALG	CERDEM	CHARA	HETDUB	MYREXA	MYRHET	NAJGUA	NAJMAR	POTAMP	POTGRA	POTHYB	POTILL	POTPUS	STUPEC	UTRGIB	UTRVUL	MYRSPI	POTCRI
36	dallas	631850	4601550	35	3		1																
37	dallas	631914	4601580	36	3		1																1
38	dallas	631960	4601600	37	3																		3
39	dallas	632037	4601540	38	11																		1
40	dallas	632069	4601550	39	3		1																1
41	dallas	632123	4601510	40	3		1										1						
42	dallas	632300	4601510	41	3												1						
43	dallas	632338	4601460	41	3		1												1				1
44	dallas	632380	4601410	44	3		1						1										
45	dallas	632404	4601390	45	3																		
46	dallas	632427	4601390	46	3		1																
47	dallas	632465	4601340	47	2.5		1						1				1						
48	dallas	632528	4601310	48	3		1					1	1	1									
49	dallas	632582	4601290	49	3		1																
50	dallas	632584	4601200	50	4.5									3					1				
51	dallas	632550	4601170	50	3		1							3									
52	dallas	632508	4601150	52	2		1										1						
53	dallas	632450	4601140	53	4		1							1									
54	dallas	632387	4601150	55	7.5							1					1						1
55	dallas	632387	4601240				1	1						1				1		1			5
56	dallas	632400	4601310	57	4.5		1							1						1			1
57	dallas	632440	4601250	58	16		1			1													
58	dallas	632298	4601310	59	19		1																
59	dallas	632206	4601290	60	7																		
60	dallas	632198	4601210	61	6.5																		3
61	dallas	632297	4601070	62	4		1																5
62	dallas	632362	4601010	63	4		1			1													1
63	dallas	632487	4600920	64	4																		
64	dallas	632497	4600890	66	14												1						1
65	dallas	632501	4600850	67	4																		
66	dallas	632482	4600770	68	3																		
67	dallas	632437	4600720	69	4																		
68	dallas	632403	4600690	70	4.5		1			1			1										
69	dallas	632455	4600712	70	4.5		1										1						
70	dallas	632487	4600684				1				1	1						1		1			1

[illegible]



[illegible]

**APPENDIX D:**  
**HYDRILLA INFORMATION**  
**FIVE LAKES**  
**AQUATIC PLANT MANAGEMENT PLAN UPDATE**

# AIS

## Aquatic Invasive Species

### HYDRILLA



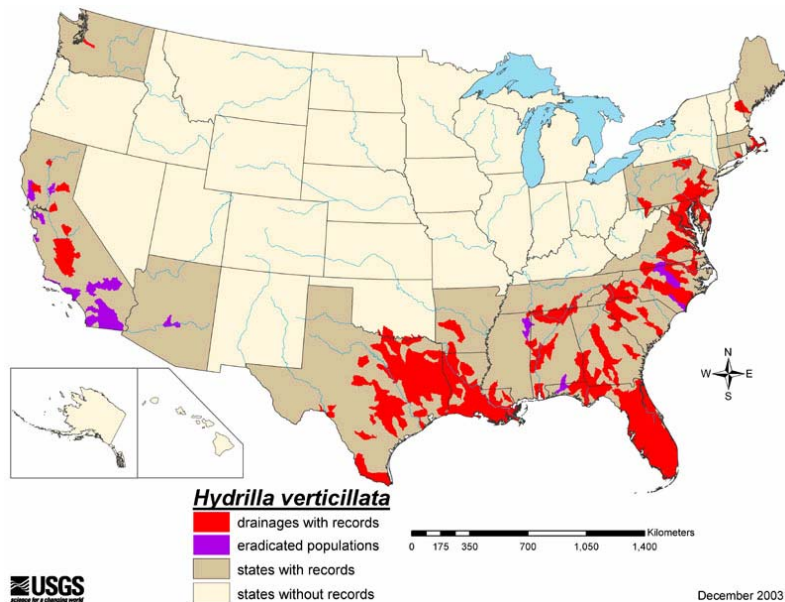
**COMMON NAME:** Hydrilla

Hydrilla is also known as water thyme, Florida elodea, Wasserquirl and Indian star-vine.

**SCIENTIFIC NAME:** *Hydrilla verticillata* (L.f.) Royle

Hydrilla's scientific name is made up of the Greek word "hydro" meaning "water" and the Latin word "verticillus" that means "the whorl of a spindle". Appropriately named, it is an aquatic plant with leaves that are whorled around the stem. Hydrilla is in the Frog's Bit family, or Hydrocharitaceae. It is the only species of the genus *Hydrilla* in the world though it resembles many of the other species in the family.

**DISTRIBUTION:** It is not really known where exactly hydrilla originated. Some sources give a broad native range of parts of Asia, Africa and Australia. Other sources are more specific and say that the dioecious form of hydrilla originated from the Indian subcontinent and the monoecious form originated from Korea. Currently the only continent without records of hydrilla is Antarctica.







**Indiana:** Hydrilla has not been detected in Indiana waters but it is on our Aquatic Nuisance Species watch list.

### DESCRIPTION:

**Leaves:** Leaves are small about 2-4 mm wide and 6-20 mm long. They are strap-like with pointed tips and have visible saw-tooth margins. The leaves are whorled around the nodes in groups of 4-8 leaves. The leaf midvein is reddish in color and usually has a row of spines on it. This gives the plant a rough texture. The leaves are usually a green color, though topped out leaves could be bleached by the sun and appear more yellowish. Hydrilla has an axillary leaf scale called a squamula intravaginalis that is found next to the stem at the base of the leaf. This distinguishes it from the other species in the Hydrocharitaceae family. One may confuse hydrilla with another exotic weed, Brazilian elodea (*Egeria densa*). Hydrilla will have rough teeth on the underside of the leaves where Brazilian elodea will not. There is also a native species found in Indiana, American elodea (*Elodea canadensis*), which looks somewhat like hydrilla.

### Identification Characteristics of the Hydrocharitaceae

Character	Brazilian Elodea ( <i>Egeria densa</i> )	American Elodea ( <i>Elodea canadensis</i> )	Hydrilla (monoecious) ( <i>Hydrilla verticillata</i> )	Hydrilla (dioecious) ( <i>Hydrilla verticillata</i> )
Leaves per Whorl	4 (3-5) 	3(2) 	5(2-8) 	4-5 (2-8) 
Serrated Edges Visible	With magnification	With magnification	Distinct on older plants	Distinct
Leaf Size	Up to 4cm	Up to 1.5 cm	1-2 cm	1-2 cm
Flowers	Male only, up to 2 cm	Tiny, male and female on separate plants	Male and female on same plants, to 1 cm	Only female plants in US, to 1 cm
Tubers Present	No	No	Yes	Yes

**Roots/Stem:** New root sprouts are white and when growing in highly organic soil they may become brown. They are submerged and buried in the hydro-soil. Hydrilla stems are very slender only about 1/32 of an inch wide, but they can grow to lengths of 30 feet. When the stem nears the waters surface it branches out considerably. The monoecious form of hydrilla will usually start to branch out at the sediment level rather than at the top of the water.

**Flowers:** The flowers are imperfect (meaning there are separate male and female flowers) but the plant can be monoecious (flowers of both sexes on one plant) or dioecious (flowers of one

sex being produced per plant). The female flower is white with three petals that alternate with three whitish sepals. The male flower has petals and sepals similar to the female flower, but the color could be white, reddish, or brown.

**Fruits/Seeds:** Hydrilla produce two different hibernacula to cover its buds. One is called a tuber, which forms terminally on rhizomes. They can be 5-10 mm long and are off white to yellow colored. Hydrilla also produces a turions which are compact dormant buds in the leaf axil. They are 5-8 mm long, dark green in color, and they appear to be spiny. The turion will break off and settle to the bottom of the water to start a new plant. The tubers are able to over winter and re-sprout as new plants as well. Seeds are also produced.

**LIFE CYCLE BIOLOGY:** Hydrilla is a submersed, herbaceous, perennial aquatic plant. It is capable of living in many different freshwater habitats. It will grow in springs, lakes, marshes, ditches, rivers, or anywhere there is a few inches of water. Hydrilla can tolerate low nutrient and high nutrient conditions as well as a salinity of up to 7%. Another adaptation hydrilla possesses, that enable it to out compete native plants, is the ability to grow in low light conditions. It is able to grow at deeper depths and can begin to photosynthesize earlier in the morning than most other aquatic plants. In the beginning stages of life hydrilla elongates at a rate of one inch per day. This continues until the plant comes close to the top of the water, here it begins to branch out. It produces a large mat of vegetation at the waters surface intercepting the light before it can reach other plants.

Hydrilla can reproduce in four different ways, fragmentation, tubers, turions, and seed. Fragmented pieces of hydrilla that contain at least one node are capable of sprouting into a new plant. The tubers of hydrilla are formed on the rhizomes and each one can produce 6,000 new tubers. When out of water a tuber can remain viable for several days, it can even lie dormant for over 4 years in undisturbed soil before sprouting a new plant. Turions are formed in the leaf axils of the plant. They are broken off and once settled in the sediment they can sprout into a new plant. Uncharacteristic of most plants, seed production in hydrilla is of least importance for reproduction. It seems that seed production is mostly used for long distance dispersal by means of ingestion by birds. The monoecious form of hydrilla puts more energy into tuber and turion production than does the dioecious form. It is good to know which form you have to decide on the best management technique.

The main adaptations that give hydrilla an advantage over other native plants are: it can grow at low light intensities, it is better at absorbing carbon dioxide from the water, it is able to store nutrients for later use, it can tolerate a wide range of water quality conditions, and it can propagate in four different ways.

**PATHWAYS/HISTORY:** Under the name Indian star-vine, hydrilla was imported into Florida as an aquarium plant in the 1950's. A farmer living near Tampa acquired the plant but was not impressed with it and threw it out into a canal behind his business. A few months later the farmer noticed that the hydrilla grew very well and decided to market it. By the 1960's severe problems caused by hydrilla were being reported. In 1990 hydrilla could be found in 187 lakes and rivers in Florida. Because there are two different strains of hydrilla found in the United States, the monoecious strain and the dioecious strain, it is believed that there was a separate introduction outside of Florida. The dioecious form is mainly found in the southern states and California and the monoecious form is found north of South Carolina. Hydrilla was brought to

national attention in 1980 when it was discovered in the Potomac River in Washington D.C. Currently hydrilla is found in approximately 690 bodies of water within 190 drainage basins of 21 states.

**DISPERSAL/SPREAD:** Once established hydrilla can easily spread to new areas. Fragmented pieces of the plant are able to root and develop into a new plant. These plant fragments are transported to new waters via boats and fishing equipment. Hydrilla's tubers and turions allow it to persist in an area. They can live dormant in the ground and can even resist a drought. Waterfowl are a vector of transport for hydrilla as well. Some waterfowl feed on the plant and may regurgitate the tubers into other bodies of water. It has been found that these tubers are still able to sprout. Birds can also spread seeds. Hydrilla is still sold for aquarium use over the Internet, which could mean expansion of its range through more introductions, accidental or otherwise.

**RISKS/IMPACTS:** Hydrilla is sometimes called an invisible menace because most of the time you don't know it is there until it has filled the water. It will shade out native aquatic plants until they are eliminated. This forms a monoculture, which will reduce biodiversity and alter the ecosystem. Hydrilla does not only pose a threat to other plants but to animals as well. When hydrilla becomes over abundant, fish population imbalances are likely. The dense mats of hydrilla will alter the waters chemistry by raising pH, cause wide oxygen fluctuations, and increase water temperature.

Hydrilla is an economic drain. Millions of dollars are lost due to reduced recreational opportunities as hydrilla mats interfere with boating, swimming, fishing, etc. In flowing waters hydrilla will greatly reduce flow and can cause flooding. For operations that require water intake, hydrilla can pose a problem by clogging the intake pipes. Waterfront property values drop in areas infested with hydrilla. Millions of dollars are annually spent trying to control this aquatic pest.

**MANAGEMENT/PREVENTION:** Control of aquatic weeds is difficult and eradication sometimes can be an unrealistic goal. Before any type of management technique can be implemented there needs to be a positive identification of the plant. Some native plants look similar to hydrilla so it is important to have proper identification.

Hydrilla has not yet appeared in Indiana, however it is not far away. If this plant shows up in Indiana waters, it needs to be eliminated immediately. While there are many methods available to control aquatic plants, the method most suitable for complete and fast elimination is chemical control. Aquatic herbicides containing the active ingredient endothall, fluridone, or diquat are all labeled for use on hydrilla.

For states that have major infestations of this pest plant, they have looked to hydrilla's native range for any insects that could be used as a biological control. Four hydrilla-attacking insects have been released. *Bagous affinis*, a hydrilla tuber-attacking weevil and *Hydrellia pakistanae*, a leaf-mining fly both were released in 1987. *Hydrellia balciunasi* is another leaf mining fly that was released in 1989. *Bagous hydrillae*, a stem-mining weevil, was released in 1991. Many different states have released one or a combination of the four insects. It is still too early to know what long-term impacts these insects will have on hydrilla. One Indiana company is helping to develop a biological control method for hydrilla. SePro Inc. of Carmel, Indiana is a

cooperator in a project with U.S. Army Engineer Research and Development Center Environmental Laboratory to grow an endemic fungal pathogen that attacks hydrilla.

Hydrilla has been listed by the U.S. government as a Federal Noxious Weed. With this designation, it is illegal to import or sell the plant in the United States. However, it is likely that internet sales still occur.

Like all invasive species, the key to preventing their spread is knowledge! You can also help by practicing a few good techniques to stop the spread of hydrilla and other aquatic invasive plants.

- ✓ Rinse any mud and/or debris from equipment and wading gear and drain any water from boats before leaving a launch area.
- ✓ Remove all plant fragments from the boat, propeller, and boat trailer. The transportation of plant material on boats, trailers, and in livewells is the main introduction route to new lakes and rivers.
- ✓ Do not release aquarium or water garden plants into the wild, rather seal them in a plastic bag and dispose in the trash.
- ✓ Consider using plants native to Indiana in aquariums and water gardens.
- ✓ If you detect this plant in a lake, pond, or stream, immediately contact the Indiana Department of Natural Resources, Division of Fish and Wildlife.
  - (317)232-4080
  - [dkeller@dnr.IN.gov](mailto:dkeller@dnr.IN.gov)
  - 402 W. Washington St., Rm W273  
Indianapolis, IN 46204

## REFERENCES:

- Balciunas, J.K., M.J. Grodowitz, A.F. Confrancesco, and J.F. Shearer. Hydrilla. 5 Nov 2003. Invasive.org. 30 June 2004. <[www.invasive.org/eastern/biocontrol/7Hydrilla.html](http://www.invasive.org/eastern/biocontrol/7Hydrilla.html)>.
- Jacono, C.C. and M.M. Richerson. Hydrilla verticillata. 18 Dec 2002. U.S. Geological Survey. 30 June 2004. <[nas.er.usgs.gov/plants/docs/hy\\_verti.html](http://nas.er.usgs.gov/plants/docs/hy_verti.html)>.
- Langeland, K.A. 1996. *Hydrilla verticillata* (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". *Castanea* 61:293-304. 1 July 2004. <[aquat1.ifas.ufl.edu/hydcirc.html](http://aquat1.ifas.ufl.edu/hydcirc.html)>.
- McCann, James A., Lori N. Arkin, and James D. Williams. Nonindigenous Aquatic and Selected Terrestrial Species of Florida. March 1996. University of Florida. 1 July 2004. <[plants.ifas.ufl.edu/mcplnt1a.html](http://plants.ifas.ufl.edu/mcplnt1a.html)>.
- Non-Native Freshwater Plants:Hydrilla. 24 Feb 2003. Washington State Department of Ecology. 1 July 2004. <[www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html](http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html)>.

Ramey, Victor. Non-Native Invasive Aquatic Plants in the United States. Aug 2001. Center for Aquatic and Invasive Plants, University of Florida and Sea Grant. 1 July 2004. <[plants.ifas.ufl.edu/seagrant/hydver2.html](http://plants.ifas.ufl.edu/seagrant/hydver2.html)>.

Species Profiles-Hydrilla. 20 May 2004. National Agricultural Library. 1 July 2004. <[invasivespecies.gov/profiles/hydrilla.shtml](http://invasivespecies.gov/profiles/hydrilla.shtml)>.

Swearingen, J., K. Reshetiloff, B. Slattery, and S. Zwicker. Plant Invaders of Mid-Atlantic Natural Areas:Hydrilla. 2002. National Park Service and U.S. Fish and Wildlife Service. 1 July 2004. <[www.nps.gov/plants/alien/pubs/midatlantic/hyve.htm](http://www.nps.gov/plants/alien/pubs/midatlantic/hyve.htm)>.

PHOTOGRAPHS compliments of the Washington Department of Ecology

Updated 3/05



**APPENDIX E:**

**AQUATIC PLANT TREATMENT PERMIT APPLICATION**

**FIVE LAKES**

**AQUATIC PLANT MANAGEMENT PLAN UPDATE**

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake

**x** Multiple Treatment Areas

☐ Check type of permit

**INSTRUCTIONS:** Please print or type information

**FOR OFFICE USE ONLY**

License No.

Date Issued

Lake County

Return to: Page 1 of 3

DEPARTMENT OF NATURAL RESOURCES

Division of Fish and Wildlife

Commercial License Clerk

402 West Washington Street, Room W273

Indianapolis, IN 46204

FEE:	\$5.00
------	--------

Applicant's Name <b>Five Lakes Conservation Association</b>		Lake Assoc. Name <b>Five Lakes Conservation Association</b>
Rural Route or Street <b>P.O. Box 3</b>		Phone Number <b>260-637-1856</b>
City and State <b>Wolcottville, IN</b>		ZIP Code <b>46795</b>
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
Dallas	Wolcottville	Lagrange
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's		Treatment areas to be determined following May survey (see AVMP)	
Total acres to be controlled	<2 acres	Proposed shoreline treatment length (ft)		Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s) mid to late May				
Treatment method:	<input checked="" type="checkbox"/> Chemical	<input type="checkbox"/> Physical	<input type="checkbox"/> Biological Control	<input type="checkbox"/> Mechanical	
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.					
Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D					
Plant survey method:	<input checked="" type="checkbox"/> Rake	<input type="checkbox"/> Visual	<input type="checkbox"/> Other (specify)	Data collected during 2006 Spring survey (JFNew)	

[illegible]

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake

**x** Multiple Treatment Areas

☐ Check type of permit

**INSTRUCTIONS:** Please print or type information

**FOR OFFICE USE ONLY**

License No.

Date Issued

Lake County

Return to: Page 2 of 3

DEPARTMENT OF NATURAL RESOURCES

Division of Fish and Wildlife

Commercial License Clerk

402 West Washington Street, Room W273

Indianapolis, IN 46204

FEE:	\$5.00
------	--------

Applicant's Name <b>Five Lakes Conservation Association</b>		Lake Assoc. Name <b>Five Lakes Conservation Association</b>	
Rural Route or Street <b>P.O. Box 3</b>		Phone Number <b>260-637-1856</b>	
City and State <b>Wolcottville, IN</b>		ZIP Code <b>46795</b>	
Certified Applicator (if applicable)		Company or Inc. Name	
Rural Route or Street		Phone Number	
City and State		ZIP Code	

Lake (One application per lake)	Nearest Town	County
Dallas	Wolcottville	Lagrange
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	2	LAT/LONG or UTM's		Treatment areas to be determined following May survey (see AVMP)
Total acres to be controlled	<6 acres	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s) mid to late May			
Treatment method:	<input checked="" type="checkbox"/> Chemical	<input type="checkbox"/> Physical	<input type="checkbox"/> Biological Control	<input type="checkbox"/> Mechanical
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.				
Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D				
Plant survey method:	<input checked="" type="checkbox"/> Rake	<input type="checkbox"/> Visual	<input type="checkbox"/> Other (specify)	Data collected during 2006 Spring survey (JFNew)

[illegible]

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist
<p>Mail check or money order in the amount of \$5.00 to:</p> <p><b>DEPARTMENT OF NATURAL RESOURCES</b>          DIVISION OF FISH AND WILDLIFE          COMMERCIAL LICENSE CLERK          402 WEST WASHINGTON STREET ROOM W273          INDIANAPOLIS, IN 46204</p>		

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

Whole Lake

**x** Multiple Treatment Areas

Check type of permit

*INSTRUCTIONS: Please print or type information*

**FOR OFFICE USE ONLY**

License No.

Date Issued

Lake County

Return to: Page 1 of 2

DEPARTMENT OF NATURAL RESOURCES

Division of Fish and Wildlife

Commercial License Clerk

402 West Washington Street, Room W273

Indianapolis, IN 46204

FEE:	\$5.00
------	--------

Applicant's Name Five Lakes Conservation Association		Lake Assoc. Name Five Lakes Conservation Association	
Rural Route or Street P.O. Box 3		Phone Number 260-637-1856	
City and State Wolcottville, IN		ZIP Code 46795	
Certified Applicator (if applicable)		Company or Inc. Name	
Rural Route or Street		Phone Number	
City and State		ZIP Code	

Lake (One application per lake) Hackenburg	Nearest Town Wolcottville	County Lagrange
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

Treatment Area #	1	LAT/LONG or UTM's		Treatment areas to be determined following May survey (see AVMP)	
Total acres to be controlled	<2 acres	Proposed shoreline treatment length (ft)		Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s) mid to late May				
Treatment method:	<input checked="" type="checkbox"/> Chemical	<input type="checkbox"/> Physical	<input type="checkbox"/> Biological Control	<input type="checkbox"/> Mechanical	
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.					
Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D					
Plant survey method:	<input checked="" type="checkbox"/> Rake	<input type="checkbox"/> Visual	<input type="checkbox"/> Other (specify)	Data collected during 2006 Spring survey (JFNew)	

[illegible]

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of \$5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**  
 DIVISION OF FISH AND WILDLIFE  
 COMMERCIAL LICENSE CLERK  
 402 WEST WASHINGTON STREET ROOM W273  
 INDIANAPOLIS, IN 46204

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)

Approved State Board of Accounts 1987

☐ Whole Lake

**x** Multiple Treatment Areas

☐ Check type of permit

**INSTRUCTIONS:** Please print or type information

**FOR OFFICE USE ONLY**

License No.

Date Issued

Lake County

Return to: Page 1 of 2

DEPARTMENT OF NATURAL RESOURCES

Division of Fish and Wildlife

Commercial License Clerk

402 West Washington Street, Room W273

Indianapolis, IN 46204

FEE:	\$5.00
------	--------

Applicant's Name <b>Five Lakes Conservation Association</b>		Lake Assoc. Name <b>Five Lakes Conservation Association</b>	
Rural Route or Street <b>P.O. Box 3</b>		Phone Number <b>260-637-1856</b>	
City and State <b>Wolcottville, IN</b>		ZIP Code <b>46795</b>	
Certified Applicator (if applicable)		Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number	
City and State		ZIP Code	

Lake (One application per lake)	Nearest Town	County
Messick	Wolcottville	Lagrange
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's		Treatment areas to be determined following May survey (see AVMP)
Total acres to be controlled	<1 acre	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s) mid to late May			
Treatment method:	<input checked="" type="checkbox"/> Chemical	<input type="checkbox"/> Physical	<input type="checkbox"/> Biological Control	<input type="checkbox"/> Mechanical
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D</u>				
Plant survey method:	<input checked="" type="checkbox"/> Rake	<input type="checkbox"/> Visual	<input type="checkbox"/> Other (specify)	Data collected during 2006 Spring survey (JFNew)

[illegible]

FOR OFFICE ONLY		
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of \$5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**  
 DIVISION OF FISH AND WILDLIFE  
 COMMERCIAL LICENSE CLERK  
 402 WEST WASHINGTON STREET ROOM W273  
 INDIANAPOLIS, IN 46204